



ANNUAL REPORTS  
OF THE  
FRUIT GROWERS' ASSOCIATION  
FRUIT EXPERIMENT STATIONS  
AND  
ENTOMOLOGICAL SOCIETY  
OF ONTARIO  
1906





R. T. Miller,  
St. Catharines.





Thirty-Eighth Annual Report

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# Fruit Growers' Association

OF

Ontario,

1906

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF  
THE LEGISLATIVE ASSEMBLY OF ONTARIO



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Printed by L. K. CAMERON, Printer to the King's Most Excellent Majesty  
1907

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TORONTO



*To the Honourable WILLIAM MORTIMER CLARK, K.C.,  
Lieutenant-Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for the consideration of your Honour the Report of the Ontario Fruit Growers' Association, for 1906.

Respectfully submitted,

NELSON MONTEITH,  
*Minister of Agriculture.*

TORONTO, 1907.

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# Fruit Growers' Association of Ontario.

## OFFICERS FOR 1907.

<i>President</i> .....	HAROLD JONES, Maitland.
<i>Vice-President</i> .....	ELMER LICK, Oshawa.
<i>Secretary-Treasurer</i> .....	P. W. HODGETTS, Parliament Buildings, Toronto.

### *Directors:*

Agricultural Division No.	1.....	A. D. HARKNESS, Irena.
"	"	2.....A. A. WRIGHT, Renfrew.
"	"	3.....HAROLD JONES, Maitland.
"	"	4.....W. H. DEMPSEY, Trenton.
"	"	5.....WM. RICKARD, Newcastle.
"	"	6.....ELMER LICK, Oshawa.
"	"	7.....A. W. PEART, Burlington.
"	"	8.....G. A. ROBERTSON, St. Catharines.
"	"	9.....H. H. GROFF, Simcoe.
"	"	10.....A. E. SHERRINGTON, Walkerton.
"	"	11.....A. O. TELFER, Ilderton.
"	"	12.....D. JOHNSON, Forest.
"	"	13.....C. L. STEPHENS, Orillia.

*Ontario Agricultural College:* Prof. H. L. HUTT, Guelph.

*Honorary Directors:* THOS. BEALL, Lindsay; A. M. SMITH, St. Catharines; W. T. MACOUN, Ottawa.

*Auditor:* J. M. DUFF, Guelph.

### REPRESENTATIVES TO FAIR BOARDS AND CONVENTIONS.

*London:* JAS. S. SCARFF, Woodstock; A. O. TELFER, Ilderton.

*Ottawa:* R. B. WHYTE, Ottawa; A. A. WRIGHT, M.P., Renfrew.

*Toronto:* W. H. BUNTING, St. Catharines; P. W. HODGETTS, Toronto.

### COMMITTEES.

*Executive:* President, Vice-President, and Secretary, with W. H. BUNTING and A. E. SHERRINGTON.

*Board of Control, Fruit Experiment Stations:* G. C. CREELMAN, Chairman; Prof. H. L. HUTT; P. W. HODGETTS.

Elected by the Association: A. M. SMITH, W. T. MACOUN, G. A. ROBERTSON.

*Transportation:* W. H. BUNTING, R. J. GRAHAM, D. JOHNSON, W. L. SMITH, ROBT. THOMPSON, H. DAWSON.

*Co-operation:* A. E. SHERRINGTON; D. JOHNSON, Forest; J. E. JOHNSON, Simcoe; ROBT. THOMPSON, W. H. DEMPSEY.

*New Fruits:* Prof. H. L. HUTT; W. T. MACOUN; E. MORRIS.

*Historical:* ALEX. MCNEILL; T. H. RACE; L. WOOLVERTON; H. H. GROFF; W. H. DEMPSEY.

*Fruit Show:* W. H. BUNTING; A. W. PEART; ELMER LICK; P. W. HODGETTS.





# Fruit Growers' Association of Ontario.

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## ANNUAL MEETING.

The forty-seventh annual meeting of the Fruit Growers' Association of Ontario was held in the City Hall, Toronto, on the 6th, 7th, and 8th of November, 1906.

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## REPORT OF THE EXECUTIVE FOR 1906.

Your Executive have met formally during the past 12 months on four occasions. Early in the new year, it was seen that the clauses relating to affiliated associations, as adopted at the last annual meeting, would not be workable under the conditions existing at the latter time. In November, when the changes were made, the numerous horticultural societies in the Province were nominally eligible for affiliation, and as these societies were receiving government assistance, it was thought that the affiliation fee should be fixed as high as 75c. per member. The day following the close of the fruit convention, representatives of the horticultural societies met and formally organized the Association of Horticultural Societies of Ontario. This action relieved the Fruit Growers' Association of any further necessity of looking after the interests of these societies, and at the same time changed entirely the outlook for membership during the coming year. None of the local Fruit Growers' Associations were receiving Government assistance and were unable to pay the high fee of 75 cents per member.

A meeting of the Executive was at once called for Jan. 2nd, at St. Catharines, and after a thorough discussion, the following resolution was drawn up:

Moved by W. H. BUNTING, St. Catharines, seconded by HAROLD JONES, Maitland, that "After consideration by the Executive Board, of the best means of encouraging the formation of local Fruit Growers' Associations upon a satisfactory basis, and the consolidation of said local Associations with the Provincial Association, it is hereby resolved that we deem it in the interests of the Ontario Fruit Growers' Association to modify sections 25 and 27 of the present Constitution to meet the exigencies of the situation, by making the following changes in the aforesaid sections; that is to say, in Section 25, the words 'seventy-five' be changed to 'fifty,' and Section 27 to read as follows: 'Each affiliated Association may send one duly accredited delegate to the Annual Meeting, one-half of whose actual expenses shall be defrayed by the Provincial Association.' It is hereby understood that the above changes are subject to the approval of the Minister of Agriculture for the Province."

In accordance with the last clause, the report was submitted to the Hon. Mr. Monteith, and after a thorough explanation, was formally ratified by him. Notices of these changes were at once sent to all interested parties, including the officers of all fruit growers' associations throughout the Province, and the result this year has been very encouraging.

At the same meeting, a committee consisting of the President, Mr. Bunting, and the Secretary were appointed to wait on the Deputy Minister of Agriculture with a view to making all proposed changes in the Agriculture and Arts Act harmonize with the revised constitution of the Association. In accordance with the request of the Executive, a meeting was held in Toronto with Mr. James. The points likely to conflict, such as the number of directors, the membership fee, etc., were talked over, and an agreement reached that was satisfactory to both parties. The new Act which comes into force in the spring of 1907 allows of greater diversity among the Associations in respect to the method of election of directors and other vital points, but makes all revision of constitutions subject to the approval of the Minister of Agriculture.

A third meeting was held during the Toronto Exhibition to consider matters relating to the Annual Convention and the Fruit Show. A draft programme was submitted and various topics suggested. The Secretary was authorized to write to J. H. Hale, the noted peach grower of Georgia and Connecticut; Roland Morrill, of Benton Harbor, Michigan, and Prof. H. A. Surface, of Harrisburg, Pennsylvania, in reference to attending the convention, but was unable for various reasons to secure their services. Prof. Surface wrote that he would accept the invitation, but wired on Nov. 30th that he could not come. Mr. E. D. Smith, owing to illness, was also compelled to refuse our invitation at the last moment. Prof. P. J. Parrott, of Geneva, N. Y., took Prof. Surface's place.

Judges were appointed for the various classes of fruit at the Show, and an allowance of five dollars was voted to each to help pay their travelling expenses. An allowance of \$20 and expenses was voted for the work of a Superintendent to assist the Secretary for the week of the Show. Mr. Kydd, of Simcoe, who had been appointed by your Board, was unable to undertake this work, and Mr. Reid, of St. Catharines, was asked to take his place. Mr. Reid has had considerable experience in such work, and was Secretary of the Niagara District Horticultural Exhibition, held in St. Catharines this summer.

The resignation of Mr. T. H. Race, of Mitchell, your Director for Division 11, was received and accepted, and as the end of the Association year was so close it was decided not to appoint a successor. Mr. Race has been connected with the Association for many years, has occupied the position of Director since 1890, with the exception of the years 1892-93-94, when he held the office of Vice-President and President. He felt that his absence from the country in his position as Commissioner to the New Zealand Exposition would take so much of next year that in fairness to the Division he represented, he should leave the office open to some one more likely to be of use to the Province and the Association.

On Sept. 14th, a meeting was held at St. Catharines to consider the question of a further revision of the Constitution rendered necessary by the new Act respecting Agricultural Associations which comes into force in 1907, and also by the changed conditions in regard to general representation, as expressed by many of the best fruit growers of the Province. Much adverse criticism of the present mode of election of Directors has been given during recent years, and it has been thought wise to allow the members of the Association an opportunity this year of expressing their opinion on the wisdom of the new method as adopted by the Vegetable Growers' Association and proposed for the two Dairymen's Associations. In addition to the Executive, there were present at St. Catharines, Mr. Murray Pettit, of Winona;



Mr. Ruddick, of Ottawa, and Mr. H. B. Cowan, of Toronto. After talking the matter over thoroughly, a sub-committee consisting of Messrs. Scarff, Pettit and the Secretary were appointed to draft out the proposed amendments in consultation with Mr. Cowan.

This Committee met on Oct. 17th, and drew up the report, which has since been submitted to each of the members by circular letter. The matter will come up on Wednesday afternoon, and it is to be hoped that something definite and feasible will then be decided upon.

#### MEMBERSHIP.

The total number of members up to the close of the year is 434. Of this number 300 have been sent in by 13 associations, thus constituting 69 per cent. The associations represented are as follows:—Niagara District Association, Arkona, Forest, Ilderton, Meaford, Orillia, Southern Ontario, Burlington, Jordan Harbor, Clarkson, Newcastle, and Oakville. The individual members have been received from various sources, chiefly by letter from the members direct. About 50 names were secured at the time of the last convention. All of those who joined the past year are men connected largely with fruit growing, the men whom we are most anxious to reach and who should take a vital interest in our association.

It will be seen that these affiliated associations are widely scattered and represent the Province fairly well except in the eastern part. Associations are, however, now started at Belleville, Trenton and Oshawa, and should these affiliate, the fruit sections of this portion of the Province will be better looked after. Your director for Division 3, Mr. Harold Jones, has expressed the hope that he will be able to get together an association of ten or more members and keep alive interest in fruit growing at the extreme eastern part of the Province where, in the St. Lawrence Valley, the Fameuse apple and kindred types succeed to perfection.

In connection with the question of membership Mr. Race's work in organizing and securing the affiliation of several associations during the year is worthy of special mention. His long acquaintance with the fruit interests of the Province and the enthusiasm that he arouses by his addresses have strengthened all of the associations that he visited.

#### CO-OPERATIVE WORK.

The formation of co-operative fruit shipping associations has proceeded steadily under the influence of the co-operative committee and with the help of the Department of Agriculture through Mr. Putnam. A number of joint meetings were arranged for during March and April and were addressed by Messrs. Sherrington, Johnson, Carey and Gifford. In addition, Mr. Sherrington visited several points by special request and succeeded in putting several associations in good shape for work this fall. About 18 associations are now in running condition and the outlook for the fruit-growers in these sections is brighter than for many years.

Two meetings of the co-operative committee have been held during the year. A full report of their proceedings will be given on Thursday afternoon. Owing to the efforts of Mr. Sherrington, the Chairman, a union of most of the associations now in existence was effected at the second meeting on August 14th, and a new association, purely commercial in its aims, was organized, to be known as the Ontario Co-operative Fruit Growers' Association. This new association will relieve your association of the burden of undertaking work outside of its regular aims, and at the same time will per-



mit of further expansion of the co-operative idea, such as placing representatives in the markets, opening up new markets, etc. We hope to receive an extended report on the work of this association on Thursday.

The Transportation Committee met in Toronto on January 16th and discussed matters that were likely to come before the Dominion Conference. A recommendation was made that the expenses of three of the delegates to the west in 1905 be paid by the association. These men were sent out to watch the treatment received by the fruit cars en route to Winnipeg, the condition of the fruit on arrival and other points of interest to the growers. The railways provided the transportation both ways. In accordance with this recommendation the sum of \$36.75 has been paid to two of the men to cover their actual expenses.

The committee were very strong in their demand that the express companies be placed under the control of the Railway Commission. This matter was brought to the attention of the Cabinet at the time of the Conference, and as a result the rates of these companies were by law made subject to the Railway Board. Two of the objects for which this committee have persistently fought, the placing of both express and freight carrying corporations under control of some board to which appeal could readily be made, have thus been accomplished. It now remains to prepare as much information as possible of all grievances against the companies, so that in case of appeal to the commission, your committee may be in possession of as much evidence as possible in support of their claims.

The county prize scheme, originated by Mr. McNeill a year ago, and adopted by fifteen counties for our previous show, was carried on again with slightly better success this year. The correspondence in connection therewith is enormous, as over 500 councillors alone had to be written to this year, together with local committees, clerks and other parties interested. Twenty-five counties were asked for the grant of \$25 and only five of these refused, namely, Elgin, Middlesex, Wentworth, Carlton and Huron. The twenty counties offering the prize are as follows:—

Brant	Lambton	Perth
Bruce	Leeds and Grenville	Prince Edward
Essex	Lincoln	East Simcoe
Grey	Norfolk	Stormont, Dundas and Glengarry
Halton	Northumberland and Durham	Victoria
Hastings	Ontario	York
Kent	Oxford	

Local parties in every instance were asked to choose the ten varieties best suited to their conditions and the whole list was then printed in the special prize list which was distributed, together with entry cards, as widely as possible. While every county is not yet as well represented by entries as we would like, the result is still very gratifying, as over 500 entries have been received.

Your secretary has to specially thank in this connection, those gentlemen who were so active in waiting on the county councils at the June meetings in support of our application for these grants. All of the directors have rendered good service, and in addition I desire to mention Mr. Robt. Thompson, of St. Catharines; Mr. C. L. Stephens, of Orillia; Mr. A. Gifford, of Meaford; Mr. Harry Dempsey, of Rednersville; Messrs. Fraser and Johnson, of Leamington; Mr. D. Johnson, of Forest; and Mr. W. D. A. Ross, of Chatham; Mr. J. C. Harris, of Ingersoll, and several others. These voluntarily took the time to attend the council meetings and were afterward enthusiastic enough to help advertise the scheme as thoroughly as possible. That they have been successful is shown by the number of entries.

### HORTICULTURAL EXHIBITION.

The exhibition of last year was generally admitted to be the finest of its kind ever held in Canada. The attendance, however, was still below the mark, and as a result there was a deficit of between \$400 and \$500. The city council gave an additional sum of \$250 on condition that the remaining sum be collected. This was undertaken by the general committee and successfully accomplished. It was felt that if the people of Toronto and the Province generally could be brought to realize the value of the show that its financial success would be assured. It was, therefore, determined to continue the show for another year and to make a still greater effort to get the attendance of the people.

The general committee have met during the year at frequent intervals; in fact during the last two months every Monday night. The special committees have also spared no effort this year to complete their work in every detail. After much thought and very careful consideration, it was decided to procure a first-class musical attraction for the week of the show, and after some correspondence the Black Dike Band, of England, which was on a tour of the world, was engaged for nine performances at a cost of \$2,000. The additional expense seemed enormous, but it was felt that it would be necessary to procure the best talent obtainable, and if the citizens of Toronto will patronize these concerts as they are in the habit of doing, there should be a much better financial statement to present this year than last.

The general prize list was ready for distribution much earlier this year, coming out about a week later than the date set by the directors. The fruit sections were printed in the July issue of the Canadian Horticulturist in accordance with directions from the board. All of the directors and as many other interested parties as possible were asked for criticisms and suggestions on last year's lists, and after much labor by the Show Committee the present list was adopted. Changes have been made in Classes 3 and 4 where the varieties called for have been specified. Owing to lack of competition, the section for hot-house grapes have been struck out. Several changes in varieties in the other classes were made to encourage greater competition. In the package sections increases were made in the prizes to bring them up to a better equivalent of the value of the fruit which has, in the case of prize lots, become the property of the association. In all about \$130 was added, making a total of \$907, or with the county prizes added, \$1,407.

The entries are well scattered over the Province, and exclusive of the county specials are about 300 in excess of last year, numbering as follows: Barrels, 63; boxes, 193; baskets, 13; plates, 442; pyramids, 43; collections, 5; jams, preserved fruits and jellies, 192.

The office labor alone in connection with these 1,392 entries has become so great that two extra clerks have been working on them since last Monday. The expenses of the show of 1906 will be considerably greater than that of 1905, the county specials having added much to both labor and expense.

### DOMINION CONFERENCE.

A full report of the proceedings of the conference has been published and generally distributed. The nine delegates appointed by the board at their last meeting were all in attendance, with the exception of Mr. Hilborn, owing to ill health, and Mr. Thompson, who was in British Columbia. Their places were taken by Mr. Ross, of Chatham, and Mr. Stewart, of Homer. Mr. Scarff and your secretary were also in attendance, as well as a number of other members, including Prof. Hutt and Mr. Woolverton.



The results of this conference will be discussed by Mr. Bunting and Mr. Peart before the association on Wednesday. It is to be hoped that the fruit growers of the Dominion will hold the Minister of Agriculture to his word to call such a conference at regular intervals. The work accomplished this year was invaluable, but there remains a very great deal yet to be done.

The Ontario delegates met at the Walker House on the day previous to the opening of the conference and thoroughly discussed the questions that had been proposed by the chief of the fruit division as worthy of attention. The instructions of the last annual meeting were also considered, and by the joint expression of opinion the delegates were much better prepared for the conference.

#### ANNUAL MEETING.

The suggestion has been made that should the annual show be continued it would be better to have the annual business meeting of the association some time after the New Year. The rush to get through a lengthy programme, see the exhibition, attend committee meetings, and, in many cases, place and look after exhibits, has become so great that one or other of these objects must suffer. Many of the other Associations have adopted the above plan, holding their show and lectures at one time and the business meetings at another.

Very good reasons can be shown in favor of this plan with your association. First, the fruit growers are just beginning to close up one year's work and are not in the least prepared to discuss definite plans for another season; second, as the financial year closes before the heaviest expenditure of the year is incurred (for the annual meeting and show) a false idea of our finances is conveyed to outside parties, including the Minister of Agriculture and other members of the Legislature, as well as to many of our own members; third, owing to the hurried nature of all our proceedings as mentioned above, the business of the association is carried on at irregular hours and undoubtedly suffers in consequence. The above change might very well be brought before the general meeting and thoroughly discussed preparatory to making the change another year. According to our present constitution, the date of the annual meeting shall be decided by the association from year to year.

In closing this report your executive desire to thank you as directors, for the interest you have shown in the various schemes taken up during the year.

Respectfully submitted on behalf of the executive,

P. W. HODGETTS.  
Secretary.

#### TREASURER'S REPORT 1905-6.

<i>Receipts.</i>	
Balance on hand October 31,	
1905 .....	\$ 924 32
Fees .....	293 55
Horticulturist .....	2 47
Show .....	482 52
Legislative grant .....	1,800 00
County Councils .....	110 00
Sundries .....	12 40
	<hr/>
	\$3,625 26

<i>Expenditures.</i>	
Show .....	\$1,010 08
Horticulturist .....	453 33
Annual Meeting .....	295 83
Committees .....	282 70
Postage .....	55 47
Audit .....	8 50
Salaries .....	300 00
Incidentals .....	211 07
Balance on hand October 31,	
1906 .....	1,008 28
	<hr/>
	\$3,625 26

## DETAILS OF EXPENDITURE.

<i>Show:</i>	J. H. Dunlop, Treasurer of Exhibition, 1905, \$200.00, 1906, \$300.00; P. W. Hodgetts, \$61.70 (express, \$22.10; cartage, \$5.75; labor, \$18.00; paper, napkins, plates, etc., \$15.85); Bryant Press, County Prize Lists, \$5.50; J. Curtis, printing cards, \$4.00; Brown Bros., Judges' Entry Books, \$21.75; Canada Stationery Co., Prize Lists, \$4.00; Model Cartage Co., \$24.50; Toronto Cold Storage Co., \$44.45; C. M. Henderson, Auctioneer, \$8.60; A. McNeill (expenses of County Prize Scheme, 1905), \$29.95; printing, etc., \$4.90; labor, sending out Prize Lists, etc., County Prize Scheme, 1906, \$10.85; refund County Councils (prizes unawarded), \$73.55; prizes, \$37.00; express and freight, \$30.26; refunds for fruit sold, \$103.57; T. B. Rivett, assistant at show, \$22.00; Methodist Book Room, printing Prize Lists, \$24.50.....	\$1,010.08
<i>Horticulturist:</i>	Periodicals for members, \$219.30; calls on stock held by Association, \$200.00; legal expense drawing up agreement, \$14.63; index, 1904, \$19.40 .....	\$453.33
<i>Annual Meeting:</i>	Travelling expenses, A. N. Brown, \$34.00; G. C. Caston, \$7.50; R. B. Whyte, \$18.10; T. H. Race, \$14.50; A. E. Sherrington, \$9.35; E. Lick, \$7.60; Thos. Beall, \$9.30; Wm. Rickard, \$7.75; Jas. S. Scarff, \$12.25; C. W. Vanduzer, \$8.50; H. H. Groff, \$11.60; M. Pettit, \$6.35; A. M. Smith, \$10.25; W. H. Bunting, \$13.65; W. H. Dempsey, \$7.83; J. L. Hilborn, \$17.80; H. Jones, \$11.70; A. D. Harkness, \$15.80; Methodist Book Room, programmes, \$10.75; W. B. Varley, reporting, \$50.00; H. B. Cowan, lighting and heating hall, \$11.25 .....	\$295.83
<i>Committees:</i>	Travelling expenses, Robt. Thompson, \$5.25; W. H. Bunting, 1905-6, \$80.75; A. W. Peart, \$4.50; Jas. Scarff, \$45.45; M. Pettit, \$13.50; A. D. Broderick, \$17.00; T. G. Bunting, \$19.75; W. D. A. Ross, \$10.10; D. Johnson, \$17.20; A. D. Harkness, \$12.60; T. H. Race, \$15.05; A. B. Foran, \$4.60; Harold Jones, \$36.95 .....	282 70
<i>Postage:</i>	Mrs. Hubertus, \$52.00; cash, \$3.47 .....	55 47
<i>Audit:</i>	J. M. Duff, \$8.50 .....	8 50
<i>Salaries:</i>	P. W. Hodgetts, \$300.00 .....	300 00
<i>Incidentals:</i>	C. Gipton, rubber stamp, 80c.; Bell Telephone Co., \$2.05; Library Bureau card index, \$4.20. T. H. Race (organizing Associations), \$93.20; Horticultural Exhibition (one-half page ad. in Prize List), \$11.00; Bank of Commerce, exchange, 75c.; G. N. W. Telegraph, \$1.09; Methodist Book Room, printing and stationery, \$39.25; Jas. Dorman, office assistance, \$5.00; Miss A. M. Fox, stenographer, \$40.00; Curran Bros., printing, \$4.60; Brown Bros., binding, \$1.75 .....	\$211 07

Examined and found correct, this 2nd day of November.

(Signed) J. M. DUFF,  
Auditor.

## PRESIDENT'S ADDRESS.

By JAMES SCARFF, WOODSTOCK.

My first duty to the members of the Ontario Fruit Growers' Association is to sincerely thank you for the honor which you conferred on me one year ago in my election to the responsible position as President of this Association, notwithstanding my inability to fill such an important and responsible position with such ability as my predecessors. However, I am free to confess that with the assistance I have received from my co-directors, a great deal of good work has been accomplished during the year; and I take this opportunity of expressing my sincere thanks to them and more particularly to the members of the Executive, for the very valuable assistance I have received from them during my term of office.



I am pleased to congratulate the officers and members of the Association on a successful year's work, and I believe our work is of the greatest benefit to the fruit growers of this country.

Our finances, as you will see by the Treasurer's report, are in a good and satisfactory condition. This year has been one of special progress for our Association, and the financial statement shows a good balance in hand, which reflects credit upon the management of the Executive.

The fruit crop of 1906 has been fairly good over the Province generally. The demand for Canadian fruit has been greater than ever, and prices decidedly firmer. The trees and vines have matured an abundance of excellent wood, making the prospect for next year's crop a good one. I regret that I am unable to give a full report in regard to the past season's crops, not having the opportunity to gather any reliable information from the various sections of the Province. The season opened with an extraordinary show of bloom, but in many cases the bloom did not set owing to cold and continuous rains during the blooming season.

The apple growers in some localities report a good yield, others light. Storm and insects during the latter part of the season have depreciated the supply of marketable fruit. Reports from British markets indicate that both American and Canadian apples for export are moving slowly. So far only 60 per cent. has left the Atlantic ports up to the same time the last two years, and the indications are that prices will be satisfactory, and good prices are now being paid growers for well packed stock of the best quality. About the middle of October, frost and a heavy snowstorm did some damage to fruit orchards in some localities in Ontario and in New York State.

I had the pleasure of attending the Dominion Conference in Ottawa, on March 21st and 22nd, where about 100 delegates were present. This conference was successful to a remarkable degree in settling many vexed questions of national interest. The meeting was thoroughly representative of the fruit interests of Canada, delegates being present from Prince Edward Island to British Columbia.

The convention was opened by Mr. J. A. Ruddick, Dominion Dairy Commissioner. After a few words of welcome, he called on Hon. Sydney Fisher to take the chair for the rest of the session. The honorable gentleman was given a very hearty reception. In opening, he pointed out the purpose of the convention as having been called to discuss matters of a national significance affecting the fruit industry, suggesting as to whether it would not be advisable to form a Dominion Fruit Growers' Association. He also submitted to the delegates' attention the question of the Fruit Marks Act, which, while working satisfactorily for the benefit of the trade, had many obstacles to its full operation. He then referred to the need of a definition of a second grade of fruit, and would be glad to receive suggestions. After mentioning several other matters, the Minister submitted them to the meeting, stating that their decision would be a guide in framing and passing suitable legislation to further promote the interest of the trade.

Several committees having been appointed, statistics of the fruit industry in the various provinces were then presented by Mr. A. W. Peart, of Burlington, Ontario; Mr. Jack spoke for Quebec; Rev. Father A. E. Burke, for Prince Edward Island; Mr. Goodfellow, for Saskatchewan; Mr. Starr, for Nova Scotia; Mr. Manson, for Manitoba; Mr. Gilman, for New Brunswick, and Mr. Martin Burrell for British Columbia. Mr. Burrell stated that British Columbia had increased its fruit growing industry 500 per cent. in the last five years. Mr. A. W. Peart submitted an excellent report contain-

ing statistical information relating to almost all branches of the fruit industry in Canada. Considerable time was devoted to the consideration of the gathering of fruit crop reports.

Mr. Saunders, Director of Experimental Farms, gave a very interesting report on growing fruits in Manitoba and the North-west Territories. Excellent addresses were delivered by Sir Frederick Borden and Dr. James Robertson.

Two very important decisions reached were those relating to the adoption of a "fancy" grade for apples, and the defining of a No. 2 apple. The resolutions relating to crop reports, railway regulations, and the development of foreign markets were also of great importance.

The liveliest discussion of the Conference was in regard to the proposed amendments to the Fruit Marks Act. You will find a very full report of the discussions which took place in the official report, which may be obtained on application to the Department of Agriculture at Ottawa.

Many regrets were expressed that provision was not made for the conference to last at least a full week. On the whole, the gathering was a decided success.

The exhibition of fruit, flowers, honey and vegetables exhibited in Massey Hall last year was perhaps the best exhibit of Horticulture that has been held in this Province, and no better means of advertising the horticultural resources of our country than this exhibition could be devised. The number of entries were more than double the number made in the previous year, and in only one respect was this exhibition disappointing, that of the attendance of the citizens of Toronto. On this account the receipts were much less than it was hoped they would be. However, every dollar of expense connected with the exhibition was paid in full without the managing committee being required to appeal to the Government for any further financial assistance.

The exhibit of fruit was much larger than in the previous year, and the quality was much superior, and, without a doubt, it was one of the finest exhibits of fruits ever held in Canada. So numerous were the entries and so close the competition that it took the judges two days to complete their work. Spécial mention is due to Mr. W. T. Macoun, of the Central Experimental Farm, Ottawa, for his excellent exhibits of 115 plates of apples and 20 of grapes. The Algoma, St. Lawrence, Trenton, Lake Huron and Simcoe Stations were well represented by large collections. The Ontario Agricultural College, of Guelph, exhibited a large collection of insect and fungus diseases, weeds, apples, etc.

The County exhibits added greatly to the appearance of the show, and proved valuable from an educational standpoint, eight Counties being represented.

The results of co-operative work in Ontario, a subject which has so frequently been discussed in many of our former meetings, is one of the most encouraging signs of progress in the development of the fruit industry in our Province. The success which this year has attended the work of the various co-operative fruit growers' associations has been remarkable. Reports of these operations will no doubt be presented for your consideration during the progress of the Convention.

The special committee appointed to consider the revision of the Constitution and By-laws (see pages 108-110, Report of 1905) are submitting a report recommending many important changes for your consideration.

In conclusion, I call your attention to the program which has been prepared for this series of meetings, and express the hope that the members



may feel well repaid for any personal sacrifice they have been obliged to make in order to be present at this busy season of the year, and I also wish to congratulate you upon the excellent exhibition now in progress in Massey Hall.

### COMMITTEES.

The following committees were appointed:—

*Nominating Committee*: Messrs. W. H. Bunting, H. H. Groff, W. M. Orr, W. H. Dempsey, G. C. Caston.

*Committee on Fruit Exhibits*: Messrs. W. T. Macoun, H. L. Hutt, E. Morris, W. H. Dempsey, M. Pettit.

*Committee on Resolutions*: Messrs. W. L. Smith, Harold Jones, H. H. Groff.

### THE GUARANTEEING OF NURSERY STOCK.

The matter of securing a guarantee of nursery stock was introduced by Mr. G. A. Robertson, of St. Catharines, who stated that the grievance had been mentioned at the Dominion Conference at Ottawa, but that it was found it could be dealt with only by means of Provincial legislation, and it was thought better to leave it to the Provincial organizations to dispose of. He stated that he had, in common with many other growers, suffered serious losses by having had supplied to him trees that proved, after years of cultivation, spraying, etc., to be untrue to name. When he had ordered Elbertas, for example, there had been shipped him a white fleshed peach that would not ripen before snowfall. He was of opinion that buyers of nursery stock should also have assurance that the scions had been obtained from producing trees, and as to where the seeds used for raising the stock had been procured, that is to say, whether they came from healthy stock or from the canning factory.

Mr. W. W. FARLEY stated that what was called for was pedigreed stock.

Mr. ROBERTSON: I am certainly an advocate of so-called pedigreed stock, but unless the growers are first educated in regard to it and demand it, the nurserymen will never offer it to us.

Mr. CASTON: So far as apples are concerned, my advice to growers is to pedigree stock themselves. This may be done by first selecting suitable varieties for stock and then topgrafting from the best trees in the neighborhood.

Mr. HAROLD JONES stated that while in his opinion it might be practicable to obtain legislation requiring nurserymen to guarantee stock true to name, he did not see how it would be possible to provide for a guarantee as to the quality of the root stock or the scions.

Mr. ORR: We could not control trees received from the United States, and I doubt very much whether we could control our own nurserymen. I think that if our people would support our own nurseries they would get better stock, as we have many good reliable men in the business. If we had done so in the past, we might have avoided the greatest curse in the way of insect pests that has ever visited this country, namely, the San José scale. Of the grapes I have planted I do not know that I ever had a vine that was not true to name. The apples have been true to name. In peaches there are perhaps one to two dozen trees among those I have brought to bearing that are not. If we go to responsible nurserymen, we can now pretty well depend on our stock. If we buy from peddlers, we must expect to be taken

in. I should be very glad indeed if nurserymen could fully guarantee their stock. They do guarantee it now; that is to say, they guarantee to replace it if it is not true to name. Of course it is a great loss to the grower in the meantime, but I do not see how we could obtain any further redress.

Mr. M. PETTIT: An explanation as to how the mistakes occur to which Mr. Robertson refers. I was in a nursery some years ago and remember seeing the owner filling an order from a block of Baldwin apples from which he was selecting all sorts of varieties.

Mr. PEART: As a fruit grower I can see the difficulties of the nurseryman if asked to guarantee absolutely that every tree he turns out is true to name. With thousands and tens of thousands of young trees he cannot personally supervise every one of them, and it is unavoidable that sometimes there should be mistakes. I have bought a good many thousands of trees, and not more than five per cent. have been untrue to name. If the nurserymen will replace the varieties that are not true or will topgraft them or replace them in some way, I think it is all they can be expected to do.

Mr. RICKARD: I have been in touch with a great deal of planting of apple trees, and I think there is practically no loss from these trees not being true to name; but while they are true to name, they may be wrong in every other way.

A MEMBER: In my part of the country it makes comparatively little difference as regards apple trees whether they are true to name or not, as they can be topgrafted very early from some other variety in the orchard. As regards peaches, the grower has little trouble in growing his own young trees and getting his buds from trees that are of known character. By this means he can tell exactly what strain he is budding from.

Mr. CASTON: There can be no doubt that jobbers impose a great deal on the public, and have been the cause of great financial loss. At the same time reputable nurserymen may generally be relied upon in this matter. Our object should be to regulate the jobbers and other irresponsible parties. Nearly everything I have got in a commercial way from nurserymen has been true to name, and I have no fault to find with them personally.

Mr. HILBORN: I have had a lot of experience in buying peach trees, and, on the whole, the American stock we have bought has been more satisfactory than that purchased in Canada. There has been a great deal of damage done in the western district through the sale of spurious and weak stock, and a law to control this matter would be desirable.

Mr. W. L. SMITH stated that he had been over the whole of Ontario within the last few years, and that in almost every community where fruit growing is carried on he had heard complaints about trees not being true to name, all of which did not come from irresponsible agents. He mentioned a case in South Simcoe where about one-fifth of the trees obtained from one of the largest nurseries in Canada proved wholly valueless. Where such cases occur, he thought that a reasonable penalty should be imposed, just as a reasonable penalty is imposed on growers when their fruit does not prove true to the description on the label. To require nurserymen, in the event of stock not being true to name, to topgraft it, was an insufficient remedy. Five to eight years would pass before the evil was discovered and then to topgraft or to offer another lot of young trees as an equivalent was altogether out of proportion to the damage and loss sustained by the grower.

Mr. ARMSTRONG: I have been a great loser on account of spurious nursery stock bought from reliable Canadian growers and from the best firms in Ontario, and I regard the question as a very serious one.

Q.—Did you buy your trees directly from the nursery or from jobbers?

A.—Directly from the nursery.



A MEMBER: Jobbers often change the name to suit the purchaser.

Mr. L. A. HAMILTON: Four years ago I began planting trees, and was altogether unfamiliar with the fruit business. The result was that I went to one of the best men in the country and explained what I wanted, telling him that I wanted the best stock he could give me, in fact I placed myself entirely in his hands. When the trees came and were planted, my man stated that they were very poor stock indeed, being twisted, gnarled and poorly grown. It is too early yet to see whether they will prove true to name or not, but I shall be agreeably disappointed if they do.

On the motion of Mr. ROBERTSON, seconded by Mr. ARMSTRONG, the following committee was appointed to investigate and report upon the proper production of nursery stock from healthy stock of bearing quality and true to name: Messrs. Macoun, Robertson, Orr, Jones, J. L. Hilborn, Farley and Johnson.

#### REPORT OF COMMITTEE.

Later the following report was presented:—

Your committee appointed at the morning session of the Ontario Fruit Growers' Association held at Toronto on Wednesday, November 6th, 1906, beg leave to report that:—

1. It is a fact that much of the nursery stock planted in years past has been of inferior quality and untrue to name, and as a result the growers who planted such stock have suffered in many cases severe financial loss as well as great inconvenience.

2. That a considerable quantity of the stock which has proved untrue to name, has been purchased from irresponsible agents and unreliable firms, but that the self-styled reliable nurserymen are not all exempt from this practice:

3. That much of the blame and dissatisfaction caused has been shouldered on the nurserymen situated in the United States, but that geographical situation is not wholly accountable for this, as there are reliable as well as unreliable nurserymen in the United States as in Canada.

4. That trees be produced true to name and sold to these growers who desire such trees under a written guarantee, and that this guarantee means that the nurserymen be held responsible if trees are not up to the guaranteed standard.

5. That the nurserymen may supply to those who desire them, trees which, on account of their cheapness or first cost, will satisfy the demands of intending purchasers, but that for the quality of which, as now, the nurserymen will not be held responsible.

6. That in the case of a dispute between any grower and nurseryman, if action be taken, the matter be settled in the court nearest the home of the fruit grower so wronged.

7. That the matter of propagation of nursery stock from the proper root stock, budded or grafted with buds or scions from healthy trees of good bearing quality of the true type of the variety, be left at present in abeyance, and that this association procure a competent speaker from the United States or elsewhere to give an illustrated lecture on this subject at our next annual convention, and that we use every effort in the endeavour to inform the fruit growers of the advisability of such a method of propagation which will in time create a demand which the up-to-date nurseryman will supply.

## NEW VARIETIES.

By PROF. H. L. HUTT, ONTARIO AGRICULTURAL COLLEGE, GUELPH.

Comparatively few new fruits have been sent to us this year for examination. But we have been doing more work than usual at Guelph in the way of originating new varieties. Many of these fruited for the first time during the past season.

We have at Guelph 120 seedling strawberries which are crosses of some of our best varieties. Among them we have some very promising new kinds coming on. I shall not refer to any of them at the present time, however, as we desire to give them a few years' trial before introducing them as something new. We also have some promising raspberries.

Some time ago we obtained scions from an English apple of high reputation in the Old Country, known as Cox's Orange Pippin. These were top-grafted on a young Tolman tree. The tree bears heavily; the fruit is handsome and of exceptionally high color, but it is subject to spot.

Q.—What is its season?

A.—Fall or early winter.

Q.—Are your topgrafts healthy at Guelph?

A.—Very, the tree is strong and vigorous. I do not think that this apple will do well in the northern parts of the Province, but it will be all right in the southern part.

Q.—Is it subject to spot in England?

A.—I do not know as to that.

Q.—It is a very slow grower, is it not?

A.—It is a slow grower.

Another variety of apple to which our attention has been called is the Minkler, which originated in the State of Illinois. The tree is hardy, vigorous, and productive. It is a long keeper, keeping with the Stark, and of good size and color.

A MEMBER: That is one of the varieties that Mr. Huggard, Whitby, has been recommending for some time.

Prof. HUTT: Yes, and I think it is an apple that is well worth our further testing.

Q.—Have you tested the Spencer Seedless?

A.—Our committee has not yet had an opportunity of reporting upon it. However, until our Experiment Stations have a chance of thoroughly testing it, I think growers should go very slow in planting it.

Mr. GROFF: I think it is in the interests of the orchardists that this variety should be investigated by this Association in its corporate capacity so that the less informed public may not be misled concerning it.

Mr. MACOUN: I had an opportunity of testing this apple yesterday afternoon. I ate one specimen, and the quality was between that of Baldwin and Ben Davis, but the apple was in a somewhat over-ripe condition. It is rather attractive in appearance. The calyx is very open, however, and you can see almost to the centre of the apple from that end. On cutting the apple open, you find a slight mildew-like appearance along this tube, which gives a very unattractive appearance to the inside of the fruit. The fruit is not altogether coreless, although I did not see any seeds. Judging from reports of reliable men in the United States, I would not recommend anyone in this country to plant trees of this variety, because I do not think it will have any commercial importance here.

Mr. A. D. HARKNESS, Iroquois: There have been seedless apple trees growing in my county for several years, and they are now of large size; one



of them would not stand in this room. They bear a very light crop, however. The description is similar to what Mr. Macoun has given, except as to color. The quality is a little more acid, and they are also more juicy than the Ben Davis, but otherwise they are no better. The trees I refer to are large enough to bear from two to three barrels a year, but if the owner gets half-a-dozen or a dozen apples from each of them he thinks he is getting quite a crop.

Q.—Where did he get the trees?

A.—He bought the trees from an agent as seedless apples, and the conclusion he has come to is that they are absolutely seedless.

Mr. MACOUN: This apple was first brought to the attention of this association by the late Mr. Whitney, of Iroquois, five or six years ago. I visited Mr. Cameron's orchard two years ago, to which the last speaker referred, and Mr. Harkness sent me flowers from this tree. The tree bears flowers such as are attributed to the Spencer, that is to say, there are no petals and it is necessary for some other tree to pollinate the apple in order to grow fruit. This may be the reason for the failure of this tree to bear.

Mr. W. L. SMITH: It seems to me that if this association has any purpose at all, it is to protect the innocent grower, and I would recommend that we should have a special report on this apple.

Mr. MACOUN: *The Canadian Farm and Home* quotes the following opinion of Prof. Van Deman, formerly Pomologist to the United States Government:—

Prof. H. E. Van Deman writes to the *California Fruit Grower* that any statement to the effect that the man Spencer "evolved" the "seedless" apple by a mysterious process after years of careful experimenting, is "a lie, pure and simple." The truth of the matter is, according to Prof. Van Deman, that Chas. Waters, a brother-in-law of Spencer, got scions of the variety from Virginia in the fifties and propagated trees from them in Wisconsin, but concluded that the trees were too tender for that part of the country. He moved to White Salmon, Wash., in 1884, but had sent scions of the variety to his son-in-law, A. H. Jewett, in 1879, and when the trees bore, the fruit was so poor that nearly all the trees were at once dug up and destroyed. Waters went to Grand Junction, Colo., in 1890, and took with him some of this "Waters' Seedless Apple," as he called it, and gave them to John F. Spencer. That is where Spencer got the stock for the wonderful new discovery which he is advertising as a revolution in apple growing. Waters states that he knows that Spencer propagated trees from the scions he gave him, for he stayed there several years and saw it done. The original Spencer Seedless Apple Co. claims to have 17 sub-companies. Prof. Van Deman writes that an attempt is being made to have the post office department issue a fraud order against them.—*Country Gentleman*.

Mr. GROFF: The fact that this apple has been termed seedless creates the erroneous impression that it is also coreless. To my mind it is a matter of secondary consideration as to whether the apple is seedless or not, but from a commercial point of view it is desirable that it should be coreless.

Mr. CASTON: It does not appear to me that it matters whether the apple has seeds or not. It lacks quality, and if it has not quality it is no good. The public looks to this association for information of this kind. \$2.50 is a pretty high price to pay for an apple tree, which, I understand is the price asked for the Spencer Seedless, and we do not want to spend money on a humbug.

It was resolved on the motion of Mr. MURRAY PETTIT, seconded by Mr. DEMPSEY, that Messrs. Groff, Macoun, Morris, Johnson and Dempsey be appointed a committee to report on the variety to the meeting.

## REPORT OF NEW FRUITS COMMITTEE.

BY W. T. MACOUN, C. E. F., OTTAWA.

There were fewer good, new fruits brought to our notice this year than usual, but some interesting and promising seedlings have fruited at the Central Experimental Farm, most of them for the first time.

The cry from the colder parts of the Province of Ontario for a winter apple of high quality and fine appearance must still go unsatisfied, but we believe that it will not now be long before we shall have an apple which will fill this long felt want. The extremely severe winter of 1903-4 killed out many varieties of apples at Ottawa, but the lessons learned from that winter have been of the utmost value, and should save many thousands of dollars to those who are planning to plant apple trees in those parts of the country where the climate is similar to what it is in Ottawa. One of the facts which was brought especially to our notice after that winter was that it was the trees of varieties which ripened their wood early which came through in the best condition. An early ripening tree means, in our experience, a tree which ripens its fruit early, hence most of the hardy varieties prove to be summer and fall sorts. But there are exceptions, and we have found that in some cases the trees mature early and the fruit is in condition for eating in late fall or early winter, yet the fruit will keep practically all winter. In other words, the texture of some apples does not break down as soon as others, even though they become fit to eat at the same time.

It is this early maturing but long keeping apple which will give us the tree hardy enough to withstand a test winter. Some winter varieties of this character which withstood the test winter at Ottawa are Winter Rose, Stone, Calumet, Scott Winter, Milwaukee, La Victoire and Baxter. None of these apples, however, are quite what is desired. The Winter Rose is an apple of good size, of fair appearance and good quality, but has not sufficient acidity for a winter apple. The Stone is of much the same character. The Calumet is an attractive looking apple, but not even enough in size nor quite good enough in quality. The Scott Winter is too small, and is not good enough in quality. The La Victoire comes nearest being an apple of the desired type, but lacks juiciness. The Baxter is a very large, handsome apple, but somewhat coarse. Since the winter of 1904, however, when it proved so hardy, we consider it a desirable apple for planting in the North. All of these varieties were originated in the North.

As was stated here last year, we have at Ottawa a collection of very promising seedlings which have been sent in by persons who have originated them. As these are being tested as standard trees rather than top grafts, they are longer coming into bearing, but our own seedlings, raised from the best apples fruited at Ottawa, are now fruiting in considerable numbers. Out of eighty-four which we have described, consisting of seedlings of Fameuse, McIntosh, Swayzie, Wealthy, Scott Winter, Winter St. Lawrence, and Dorkham Russet, twenty-one have been considered sufficiently promising to propagate for further trial, so that if this proportion, which is 25 per cent., of promising apples is maintained through the 2,000 apple seedlings which are being grown we should have about 500 promising varieties to select from. In addition to these, a number of promising crosses have fruited, and many Russian seedlings also. There is a temptation to disseminate some of the best of these, but we believe that even though it takes a long time it is best



to thoroughly test a variety before recommending it, as there are too many kinds on the market already.

It is interesting to note among the seedlings which have fruited the more or less resemblance in most cases to the female parent and to the probable male parent or the tree growing near that from which the fruit was taken in the orchard. This is particularly the case in regard to the seedlings of Wealthy and Swayzie Pomme Grise. Near the original tree of Swayzie is a tree of Baxter. The large size of the Swayzie seedlings and the large dots on the skins show the Baxter blood, and in one instance a large Swayzie seedling looked very much like Baxter in outward appearance. The Wealthy seedlings nearly all have that smooth, symmetrical surface peculiar to the parent, and in some instances the seedlings have been quite crablike, showing the crab origin of the Wealthy, as claimed by Peter Gideon, the originator of it.

Some good grape seedlings fruited this year, the seedlings of Brighton being particularly promising. One of these, a black seedling, almost identical with Brighton in flavor, but a finer grape, will, we believe, be an acquisition.

There are two new apples which have been fruiting at Ottawa for several years which we would like to draw your attention to. These are the Walter and the Hoadly. They are both about the season of Wealthy, but have proved very hardy and have merits of their own.

*Walter*: Originated by the late P. C. Dempsey. Fruit roundish, rather irregular; very large; cavity deep, medium width; stem short, moderately stout; basin deep, medium to open, almost smooth to moderately wrinkled; calyx open; color greenish yellow, splashed and streaked with red; dots few, small, white, distinct; skin moderately thick, moderately tender; core small; flesh yellow, rather coarse, juicy, melting, subacid; flavor pleasant, high; quality good; season October.

*Hoadly*: Originated in Wisconsin. Fruit oblate; size above medium; cavity deep, moderately open, slightly russeted; stem short, slender; basin medium depth and width, almost smooth to slightly wrinkled; calyx open; color yellow, splashed and streaked with carmine; dots few, yellow, indistinct; skin thick, moderately tender; flesh yellowish with traces of red, juicy, rather tender, briskly subacid; pleasant flavor; core medium; quality above medium; season October. Tree an upright grower, hardy and productive. Scions obtained from the late J. L. Budd, Ames, Iowa, U. S.

MR. MORRIS: The object of this committee is to report on fruits that are considered worth disseminating. I had many seedlings sent me last season in the course of my business, particularly in peaches. Some were really good, but they came at a season of the year so close to others, or they were so similar, that I did not think there was any place for them. I never yet received a specimen of an apple, unless it was Laxelle, that I considered worthy of a place in an orchard. I think that Laxelle will be a valuable apple in the north. With regard to Cox's Orange, we hardly consider it a valuable apple in a commercial way except for near-by markets. If picked when ripe it would spoil by the time it reached the English market. It does not spot with us. The Mingley scarcely colors with us, and I do not think it would color in northern sections.

MR. GROFF: I should like to take emphatic exception to Mr. Macoun's remarks in regard to the desirability of any chance work in plant breeding as compared with the more modern, efficient and scientific process of selection. My experience in my line of breeding enables me to see that it is applicable to every branch of plant breeding. The only way whereby we can hope to progress to any length and lay a foundation of more valuable

material on which to work is by the scientific selection of the parents which we cross. By the chance method suggested by Mr. Macoun, it is impossible to keep an absolute record of such crosses. It is not desirable, for the reason that in cross-breeding it is not possible to produce identical results by the repetition of the same crosses.

MR. MORRIS: With regard to the production of new varieties, and the methods followed by Mr. Burbank, I do not know of a single new fruit produced by him that equals the old established kinds. He has produced numberless varieties and crosses from Japanese plums, but not one is equal to the two kinds that came originally from Japan. My advice is this: If you have an odd apple tree away from the rest of the orchard, graft two or three kinds on that tree, and when they begin to bear, plant the seeds from them. It is a simple and easy method. Get a strong, hardy kind as a foundation, such as McIntosh, Baldwin, or Baxter, so as to give the tree strength and constitution. The seedlings from an isolated tree will either come true to name, or else they will represent crosses of the different varieties grafted on the tree.

MR. GROFF: This will not prevent the reversion of seedlings to the original type. The proper condition of control can only be arrived at by many crosses and proper selection for many generations. When you get your material in a condition of control there is no difficulty in securing any quality you may desire by breeding from the proper parents—flavor, texture, color, size, early or late season—these things are absolutely under the control of the hybridist. Further than that, the results of this work, carried on extensively—I speak of the result of over half a million of offspring bred in this selected way—is beyond the grasp of the human mind. Progress has been so marked as to warrant me in saying that this is the proper method of producing new varieties. Mr. Burbank's failures have been because he did not specialize. He has done too much superficial work.

MR. MACOUN: I agree with Mr. Groff perfectly that, under his conditions, better results will be gained from intensive work. In the case of the apple, where it takes so many years before a variety can be properly tested, I think we should carry on a certain amount of this rough and ready work while other more scientific lines are being followed. I agree that under Mr. Groff's method, results may be controlled, but in dealing with tree fruits like the apple, we have to wait a long time before we know what the result is, whereas, Mr. Groff in his work obtains results in one season. I may say that at Ottawa we are getting good results from the method I have suggested—that is to say, twenty-five per cent. of our chance seedlings are sufficiently promising to warrant us in retaining the trees. I think we can get a larger proportion of good results in this way, in the line mentioned, than by any other method.

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### THE SPENCER SEEDLESS APPLE.

Your committee appointed to examine into the claims made for the Spencer Seedless Apple, beg leave to report as follows:

We secured specimens from the exhibit at Massey Hall which showed the following objectionable characteristics in apparent contradiction to the printed description:

Although the core is smaller and less distinct than in the average apple, there is still sufficient to make the process of coring a necessity.



The practical absence of the calyx tube leaves an abnormally large and deep opening reaching to the core, thereby involving loss of flesh nearly equal to a normal core, as well as affording a harbor for injurious insect pests.

The specimens examined by us showed this space to contain an objectionable mould-like accumulation. They also gave well developed seeds, though fewer than the normal apple.

As to size, the specimens seen by us were about equal to our Fameuse or Snow, and those tested for quality and flavor were about equal to the Ben Davis.

We believe that our inspection warrants the advice that the trees of this apple should be purchased only as a curiosity.

The local representative of the company, who was present, said: I have been accorded the courtesy of making a few remarks in reference to the report brought in by your Committee on the Spencer Seedless Apple. The firm that is interested in handling this apple in Ontario has made an exhibit of this entirely new and distinct variety of fruit at the Horticultural Exhibition here in order to give the public fully and frankly all the information there is to be had bearing on the matter. I understand that your committee submitted its report to this association this morning. I have not had an opportunity of examining it except what has appeared in the *Toronto Daily Star* in reference to it. To the statements appearing in the press, we desire to take a few exceptions, based on the lack of information at the disposal of your committee. We are informed that the committee called at the exhibit, but that they did not make themselves known, and consequently some explanations which they should have had were not given them.

First, it is stated that "although the core is smaller and less distinct than in the average apple, there is still sufficient to make the process of coring a necessity."

On this point I desire to say that the function of a core is to protect the seed. The Spencer seedless apple being without seed, there is no longer this function for the core to perform. For that reason the core is not developed, but the cells are thin and paper-like, and by a process of nature are taken up by absorption. By the time the fruit is ready for eating, which is about the month of March, the presence of the core is no longer evident. After producing the first seedless apple, Mr. Spencer continued his experiments and by a process of careful selection, budding and grafting was able to produce an apple that eliminates the necessity for a core, and at the time the fruit is ready for consumption the core has disappeared.

"The practical absence of the calyx tube leaves an abnormally large and deep opening reaching to the core, involving loss of flesh and affording a harbor for insect pests. The specimens examined showed this space to contain an objectionable mould-like accumulation. They also gave well developed seeds, though fewer than the normal apple."

In regard to this matter I have only to say that the same process of careful selection in budding and grafting that I referred to above, has enabled Mr. Spencer to produce in his last generation of tree an apple that is no more open in this respect than is an ordinary apple. The fruit specimens from this last generation of trees are limited on account of the trees not being in full bearing. The supply of fruit for this exhibition came from the home orchard at Grand Junction, Colorado, and most of the apples were from the older trees, but we also have some of the more recently developed specimens,

which we are ready and anxious to show to anyone visiting the exhibit. In these specimens the calyx is so nearly closed that it is very little different from the ordinary apple.

To allay any suspicion of fraud, and to assure the public of our genuineness, we have taken this opportunity of exhibiting the fruit in order that they may see the merits of the apple. We freely cut the apple open before the public and give them an opportunity of tasting it. The unanimous opinion is that the apple compares with the Baldwin in quality and texture. It is also a splendid keeper.

With reference to its seedless character, I may say that out of one hundred specimens cut, we found but one seed. In this respect the apple is very similar to the seedless orange, in which fruit you will come across an occasional seed also. The reason for this is that where the branches of these trees interlace with those of seed-bearing apples you will occasionally find that a seedless specimen has been fertilized by a seed-bearing variety, and on that account we occasionally find a seed present.

Hon. John Dryden made a trip to investigate this apple and the business methods of the parent company. His integrity no one can question. He made a full and unprejudiced report, and it is worthy the attention and consideration of every fruit grower in the Dominion. I may say further that the company operating in this country has no connection whatever with the parent company, except that it has obtained the right to grow these trees here.

MR. GROFF: As chairman of the committee, I should much prefer that the whole report be read in order that the description of the apple as we found it may be thoroughly understood by those present. There is no intention on our part to say anything that is unfair to the concern handling the Spencer seedless apple. At the same time it is the proper thing that we should report both as a committee and as an association exactly what we believe the facts of the case to be.

This gentleman states that he has found a very limited number of seeds in the apple. Our committee found three seeds in two apples.

After the report had been read by the secretary, the representative of the Spencer Company stated as follows: "We do not contend that the apple is absolutely devoid of seeds at all times, for the reasons I have already given, but we claim that we have an apple the nature of which is to be seedless, and if not contaminated from outside influence, a seedless fruit will be developed."

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## THE DOMINION CONFERENCE OF FRUIT GROWERS AND ITS IMMEDIATE RESULTS.

BY W. H. BUNTING, ST. CATHARINES.

As one of your representatives to the Dominion Fruit Conference at Ottawa last March, I have been requested to give you a short resume of the immediate results of that gathering of representatives from the different provinces of the Dominion. It is not my intention to go into the matter in an exhaustive manner, as the proceedings of the conference have been printed, and for extended details I will refer you to that report, which will give you the addresses, and the discussion that took place. The report is well worth reading by any person who is interested in the fruit industry.



The conference was known as the Second Conference of the Fruit Growers of the Dominion. As many of you are aware, the first conference was held in the same city some sixteen years ago. I did not have the pleasure of attending it, but I believe that matters of a somewhat technical character were discussed, and it was felt then that the result of the conference was of such value that it should be continued from time to time, and an attempt was made to form a Dominion Horticultural Association. Through circumstances which were apparently unavoidable, that organization never succeeded, and until last March no similar gathering was ever held. During this interval great changes had taken place in the fruit industry in line with the progress in other branches. As fruit growers we have extended our boundaries on every side, and in almost every Province in Canada at the present time fruit growing has become an industry of importance. It was felt that, as this Dominion is very broad, and as the interests involved are very diverse as well as important, a gathering of the representatives from the different Provinces once more was not only very desirable but absolutely necessary. With this object in view, the various provincial associations have, during the past few years, been making an effort to attain this object. While I presume that the initiative came from this Association, I think I should fail in my duty if I did not refer to the indefatigable efforts of our modest Chief of the Fruit Division, Mr. McNeill, who was untiring in his endeavor to bring about this conference, and who did so much in the work of organization to further its success. In fact if Mr. McNeill had done nothing else since his appointment as Chief of the Fruit Division (and I think we must all admit that his works are legion), the very fact of the assembling of this conference particularly under his auspices, is a sufficient apology for his existence as administrative officer in the Fruit Division.

The keynote of the conference was a desire on the part of the representatives to get together and compromise as much as possible conflicting ideas and diverse opinions upon subjects likely to be discussed. In this connection Hon. Mr. Fisher in his opening remarks made use of some expressions which I think I shall do well to repeat to you as striking the keynote of the deliberations of the entire conference. He said in part as follows:

"This conference is essentially of a national or of a Dominion character, In every Province of the Dominion where fruit growing is practised, and that means nearly all our Provinces, there are provincial organizations which deal with the conditions and circumstances of the individual Provinces as they effect fruit production. These associations are in existence everywhere, But we have to-day in our fruit industry problems which are international in their character and which overlap from one Province to another, and have to be dealt with on a national basis. It is particularly to this class of problems that I wish to direct the attention of the conference. We have, as you have noted in the list of delegates, representatives from the Maritime Provinces at one extreme, and from British Columbia at the other. Interests are diverse in these different localities, and there may be differences of opinion, but we must try to harmonize these differences, and I trust and believe that you will succeed in doing so. We have had many instances of apparent difficulties in this Dominion, but on frank and free discussion they have disappeared, and we have been able to reach a national expression, embodying the best interests of the country. The previous conference attained that end, and we shall accomplish great good for the Dominion by following in their footsteps."

In giving expression to these remarks, as I said, Mr. Fisher struck the keynote for the deliberation of the conference. While at times there arose

matters which seemed to be of a controversial nature, I failed to hear at any time a note of discord or anything that would appear in any way as bitter or narrow in connection with these discussions. In a letter to me a short time ago in proof of this fact, Mr. McNeill stated as follows:—

“One of the most important results was the breaking down of sectional feeling, which is bound to exist between Provinces so widely scattered as those of the Dominion. Nothing could be more marked than the amelioration of long-standing frictions. In this connection the conference may be said to have risen to the dignity of a nation-builder inasmuch as without this sentiment political union would be of little value.”

To come now to the results of the conference, it is my desire merely to touch upon three or four of the salient features, leaving my colleague to fill in or to elaborate as he may see fit.

The first item of importance brought up was an exhaustive treatise by Mr. Peart on the statistics of the fruit industry. I may say that I was somewhat curious to learn just what Mr. Peart would be able to make of that subject, owing to the difficulty we have in Canada of securing reliable and accurate statistics in reference to the industry. While statistics have been compiled giving data of a certain character, we have felt that we were lacking in a systematic method of securing data for statistical purposes. In coming before any body of business men and presenting to them the importance and value of the industry, we have been at a loss to secure accurate information in this respect. I was very much surprised indeed that Mr. Peart had been able to secure the data he presented. It was exhaustive so far as it could be, and extremely valuable, but it only went to show the necessity of some system, both Dominion and Provincial, whereby accurate information could be obtained. I think that as an association, we should press for that work being forwarded in our own Province, which is the banner fruit growing Province of the Dominion.

The next important matter was a discussion of the Fruit Marks Act. This Act was brought into force largely at the request of this Association, for the reason that complaints had appeared from time to time in reference to the condition of our fruit in foreign lands. The measure has given very much satisfaction and has proved beneficial to the trade generally, as you know. It possessed, however, some weaknesses which it was felt should be remedied. The Minister of Agriculture was anxious that this should be done, but was waiting for some pronouncement from those interested. One of the most serious difficulties was the question of the No. 2 grade. Fruit growers had talked it over from all sides. It had been taken up and laid down, and it seemed to be a very difficult matter to arrive at a definition that would meet with the approval of all concerned. A definition has now been arrived at. While no doubt it will not meet with the approval of every individual, still it met with the approval of the conference and has been accepted by the Government and become part of the law. I am pleased to learn from undoubted authority that the working out of the decision has already proved beneficial, and that whereas up to this year the No. 2 apple was anything at all, it is already taking its place as a commercial product with a definite known value. As the definition becomes better known and as packers and growers educate themselves to the conditions involved, I have no doubt that the No. 2 apples will take a place very little inferior in price to No. 1. The No. 3 grade will then cover a larger portion of the balance of commercial apples, which at the present time is allowed to go to waste in the orchards, or is passed off as No. 2.



Another grade is named "Fancy" to meet the wishes of our British Columbia friends, and also of those growers who are practising improved methods, and who desire to put upon the market something strictly fancy. While we from Ontario and Nova Scotia are objecting to the very strict definition of this grade, which is such as to be almost unattainable, I understand that a certain amount of elasticity is to be allowed in practice when accepting the definition. These were two of the principal points in connection with the Fruit Marks Act that were provided for, and I certainly believe that the near future will show that the legislation in that respect has been wise.

Another subject of great importance to the fruit growers was the adulteration of fruit products. It was shown that to some extent the preparation of fruit products in this Province was not absolutely free from suspicion, and representations were made to the Dominion looking to the placing of safeguards around the preparation of fruits, so that substitutes could not be placed upon the market.

Another point on which it was expected that there would be considerable controversy and probably great difficulty in arriving at a satisfactory conclusion was the question of packages. It has been felt that uniformity was extremely desirable in baskets, boxes and barrels so that no matter from what province they might come, not only would the quality be definite, but the quantity would be definitely and well known. With this in view, efforts were made to regulate the size of the barrel, box and basket to be used. While the question of packages was not finally disposed of, considerable progress was made. The 28 1-2 in. barrel was approved by all present, as was the standard box, 10 x 11 x 20. Some details with reference to one or two sizes of baskets in use in certain sections were not definitely decided, but I desire to say that they are on a fair way of being disposed of, and I understand there has been greater uniformity in connection with baskets this year than ever before. Had it not been for unfortunate circumstances in connection with one or two of our factories in this Province, I think perhaps our baskets would have been almost uniform this year.

The question of transportation has always been a live one with commercial fruit growers. It was taken up and discussed from various standpoints in reference to the express business, the freight service and carriage by water. A great deal of valuable information was brought out and a series of resolutions were brought forward and heartily endorsed, and if the fruit growers of the Dominion are able to succeed in having them made operative, it will result in very great improvement in transportation. We have encountered many difficulties in that respect during the past few years, but we are hoping for better things in the future.

One of the items to which I should direct your attention was the effort on the part of the conference to have the express companies placed under the control of the Railway Commission. When the new Railway Act was passed, and a Board of Commissioners appointed, the express companies by some means escaped being placed under the control of that Board, and it was felt that this was a serious oversight. A committee from the conference waited on the Premier and his colleagues and made a strong effort to have the express companies placed under the control of the Commission, and, as you are no doubt aware, legislation was passed, although at the interview Sir Wilfrid did not give us very much encouragement that he would bring down anything in the way of an amendment owing to the lateness of the session and the pressure of work. However, the representations were so well put and considered so strong that during the session, legislation was brought

in and passed which placed the express companies under the control of the Commission. It now remains for the fruit growers who feel that there are grievances in this connection which should be redressed, to prepare their case and present it before the Commission, feeling assured that they will get an impartial hearing and that justice will be meted out where it is required. A strong committee representing the various provinces was formed with the object of aiding and promoting, from the standpoint of the whole Dominion, facilities for the moving of our fruit to the centres of distribution and placing them in the hands of the consumer in a more satisfactory condition.

Many minor matters were brought up during the two or three days of the conference and every moment seemed to be crowded with business from start to finish. The Minister of Agriculture, before the close of the conference, signified his willingness to make such arrangements as would provide for the assembling of a similar conference every two or three years, and I am sure that this Association may congratulate itself on the effort it put forth to have this conference inaugurated.

I wish to thank you for the honor you conferred upon me in appointing me as one of your representatives. I did the best I could, took part in the discussions, and endeavored to reflect the opinions of the fruit growers in the Province of Ontario as well as I was able.

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## THE DOMINION CONFERENCE OF FRUIT GROWERS—FUTURE POSSIBILITIES.

BY A. W. PEART, BURLINGTON.

Mr. Bunting has given you a very clear statement of the proceedings at the Dominion Fruit Conference last March, but there are two or three features which he did not touch upon to any great extent, and these I shall refer to more fully. I entirely endorse what he said in regard to the spirit shown at that conference. As the delegates were from all parts of the Dominion, there appeared to be during the first day's proceedings a certain amount of Provincial prejudice, and the delegates from each of the Provinces were somewhat inclined to group themselves together, but by the third day of the conference the delegates from different parts of the Dominion were intermingled, and this showed the spirit that prevailed. As business proceeded the feeling became more and more one of unity of purpose and spirit.

With regard to water transportation for fruit, I may say that in the Burlington district we have been in the habit, during the past eight or ten years, of sending perishable products in the shape of pears, plums, grapes, tomatoes, etc., to the Old Country, and have met with very varied success. Some shipments went through all right, while others would scarcely pay their way. We had hoped that as time went on the cold storage arrangements on board ship would become more and more complete, and I think that our experience last August—if you were to compare it with our experience three or four years ago—would certainly show that cold storage is much more reliable and more efficient than it was formerly. In August we shipped Clapp Favorite and Bartlett pears to Glasgow, and they arrived in practically the same condition as they left our orchards. We had gotten into the habit of picking our fruit rather on the green side, and did so this year, with the result that the pears were somewhat too green when they reached



their destination. We feel, therefore, that in the line of cold storage something is being done. I am one of those who think that there is a future before the tomato growers of this country in the business of exporting certain classes of tomatoes. For three seasons I tried to export them, using the variety known as Honor Bright, a firm, late-ripening variety, probably the best in quality of any that I am acquainted with. It met with varying success. One shipment reached Glasgow in good shape and sold at a very profitable price; another shipment was a little off and sold lower; another reached there in still worse condition, and I had to pay the charges. I am in hopes that some of our vegetable experts will give more attention to the production of a new variety of tomato which will be fit for export purposes. The Honor Bright is the best I know of at the present time for that purpose, but it is rather late in the Burlington district. If they could develop a medium-sized, smooth, firm, good quality tomato that would come in two weeks earlier than the one I referred to, it would form a very valuable addition to our varieties.

In regard to insect and fungus pests, this question was also dealt with by the conference. I do not know that anything of a new character was brought to the surface in the way of methods of treatment, but the methods we are already acquainted with were emphasized. I will say that the man who discovers a remedy for the codling moth will earn the personal gratitude of the fruit growers of this Province. In our district I think the moth destroys one-third of the value of the apple crop. I have tried a number of methods of treatment, among them spraying with Paris Green, and sowing the orchard with peas, then allowing the hogs to harvest the crop and incidentally eat the fallen apples, thus destroying many worms. This method is satisfactory so far as it goes, but it is not a complete remedy. I have tried bands and believe they are good if properly taken care of, but if you neglect to remove them at the proper time, you simply furnish homes for the moth and aggravate the trouble. I do not think there is any effective and satisfactory remedy yet discovered which will control the moth.

A resolution in regard to markets and marketing was passed. It was to the effect that the Dominion Government should appoint agents in various foreign countries wherever apples are sent, whose sole duty it should be to open up and exploit those markets in the interest of Canadian orchardists. The question of markets is a very important one to the apple growers of this country. The resolution was passed and it is possible that in the near future something may be done in this line.

The question that I was requested to speak upon to-day more particularly is that of fruit statistics. I think that the conference has already had some beneficial results inasmuch as according to the programme, the Deputy Minister of Agriculture has been induced to give us an address on the subject, and I am bound to say that I believe when Mr. James takes hold of the question something will result from it. I need not say that statistics in regard to the fruit industry of the Province and of the Dominion is an important question. Some years ago I did a certain amount of Institute work, and time and again I was asked by fruit men in various parts of the Province what was the value of the fruit industry, what was the average annual value of the apple crop in the Province, and questions like that. I had no data; I could not answer the questions. When Mr. McNeill asked me previous to the last conference to go into the question, I tried to do something with it. I sent for the Census Report for 1901 and the Dominion Trade Reports, and delved into those figures for a month or so and tried to evolve something that might be useful to the conference. I found that in the 1901 Census Report:

(1) The values of the fruit and vegetable crops are lumped at \$12,994,900.

(2) That in connection with the number of trees, there are separate columns for apple, pear, plum, peach, cherries and for "other tree fruits," bearing and not bearing by counties, provinces and Dominion.

(3) In connection with the crop yield there are separate columns for each of the above classes by provinces, counties and Dominion.

(4) That in regard to acreage, all orchards are lumped together. The acreage in vegetables and small fruits is lumped; vineyards are given separately.

The statistics at present collected by the Province of Ontario give the following information:—

(1) Acreage of orchard and garden by counties and province;

(2) Acreage of vineyard by counties and province;

(3) Number of apple trees, fifteen years old and over, and the number under fifteen years by counties and province;

(4) Also, total crop in bushels, and average number of bushels per tree, by counties and province.

I would recommend that the Department be asked to give further details as follows:—

Acres of apple orchard. County and Province.

" pear	"	"	"
" plum	"	"	"
" peach	"	"	"
" cherry	"	"	"
" other tree fruits	"	"	"
" small fruits	"	"	"
" vineyard	"	"	"
" garden truck	"	"	"

To continue giving the number of apple trees by counties and province and also the average yield per tree.

Mr. Peart then moved the following resolution, which was seconded by Mr. Harold Jones and carried:

That the Government of Ontario be asked to publish yearly in the Report of the Bureau of Industries further details of the fruit industry of the Province.

## ADDRESS.

By J. A. RUDDICK, DAIRY COMMISSIONER, OTTAWA.

I have been very much interested in the discussion that has taken place here this morning on the election of directors, and I observe that this Association has to contend with the same difficulties in this connection as other similar associations meet with in other parts of the Dominion. It appears to me that it would be a good thing, both for this and other associations, if some plan could be devised for the conduct of the elections so that the time of the delegates who come so far to attend these meetings might not be occupied so long with the matter. Still I think it is a good thing that you should take an interest in this question and that there should be an intelligent selection made.

I am glad that the question of the standard size of baskets has come up in the form of a resolution. I hope that the influence of this Association,



supported by that of the basket manufacturers, may result in the desired amendment to the "Act Respecting the Packing and Sale of Certain Staple Commodities."

I am glad to observe that the co-operative movement is making some progress in Ontario in connection with the shipping and packing of apples, and other fruit. I am a strong believer in the principle. Canadians as a rule are not very favorably inclined towards co-operation. Some people say we are too independent and want to act individually. The most truly independent people I know of have made the most progress in co-operation. I refer to the Danes. Co-operation makes for true independence. I should like to ask the representatives of the Co-operative Fruit Growers' Associations whether they do not feel that they have more power and that they are in a more independent position in many ways than when they were acting individually. The spirit of co-operation is abroad, and I would only add that as far as the Department at Ottawa with which I have to do, is concerned, we are only too glad to lend our assistance and support in any way in which we are competent to give it. The extent to which people co-operate is a very good indication of the amount of progress they have made from a state of savagery. It is among savage races that we find individualism carried to the extreme. As we progress in the scale of civilization, our needs for co-operation increase. I am sure that anyone who visits Denmark and examines even casually the methods and results obtained there, cannot fail to be impressed with the importance of the question. They are the most successful agriculturists in the world to-day, and their work is done almost entirely under some form of co-operation. The Danish farmer is the best educated farmer in the world—educated in that which will help him along in his own line of work. He may not have a better literary education than many others, but he has been educated along the line of agricultural effort to such an extent that he is able to sink his individuality for the sake of the general good; that is why co-operation has been such a success in Denmark. They are loyal to their institutions; they stick to them through thick and thin because they are able to see beyond a momentary gain to the ultimate result of any particular course of action. They will not be weaned from their own institutions even though they are offered higher prices from outsiders, and this is why they have made the movement such a success.

I think there is great room in this country for the development of cold storage in connection with the handling of our fruit products. I have no very definite idea at present as to how this ought to be worked out, but I see some movements in progress that are calculated to render very great assistance to the industry. In New York State they have had great success in this direction and by this means they are able to preserve their fruit in good condition and thus avoid temporary gluts in the market.

I have been giving some attention to the question of transportation. The Middle Canadian West, which is rapidly filling up, will, in the near future, require an enormous supply of fruit. In that country where everyone must buy his fruit, the demand will be very great. It will mean a tremendous amount of traffic in handling tender fruits, and in those that can be transported more easily. I have been giving some attention to the shipments made by the St. Catharines Cold Storage Association during the past season, and may say that they have been very successful indeed, even as far west as Calgary. I am pleased to be able to state also that some successful shipments of tender fruits have been made to the Old Country this year. Transportation facilities on the ocean have been very much improved and so have the facilities for handling all kinds of perishable products on the other side. They are just waking up in Great Britain to the importance

of cold storage establishments. The success of the cold storage plant at the Surrey commercial docks is influencing the authorities at other points to take similar action, and it will not be long before you will find cold storage right on the quays at all the leading ports. These things are of great importance to fruit growers, and I believe there is a very much better chance to-day than ever before for successfully placing tender varieties of fruit on the Old Country market. Not long ago I interviewed some of the Covent Garden people and they spoke very highly of some of the peaches sent from this country. These were shipments that had received the benefit of the cold storage system I referred to.

The future seems to be full of promise for the fruit grower in the Province of Ontario. You may have difficulties to contend with, but you are beginning to handle these things in a better manner than formerly. It seems to me that what the fruit business of this country needs more than anything else is organization. Cold storage will not remove all the difficulties nor prevent all the waste that is going on. A good many people who have not thought much about it go round the country and see the vast quantities of apples lying on the ground, and come to the conclusion that if we only had cold storage the whole of this waste would be avoided; something more is required. Proper organization is necessary. Many farmers have orchards, but the orchard is only a side line. If he has a crop, he is so much ahead, but if it is a failure, he has not been depending on it. The majority of our farmers who are growing apples are not orchardists. What we need is more farmers who are orchardists, giving more special attention to their orchards so that the apple raising business may cease to be a mere side line.

### FRUIT STATISTICS.

BY C. C. JAMES, DEPUTY MINISTER OF AGRICULTURE, TORONTO.

Mr. Peart has called your attention to the resolution adopted at the Ottawa Fruit Conference in reference to the collection of fruit statistics, and I suppose that this resolution was intended to be the basis of anything I might have to say to you this afternoon. This is one of those questions which it is so easy to ask and so difficult to answer. One might almost say there are no fruit statistics; and anyone who undertakes the task of trying to collect them will find that he has undertaken one of the most difficult statistical propositions to which he could set himself so far as this Province is concerned. Back in 1892, when perhaps we were not so wise as we are now and dared to attempt greater things than at present, we thought we would undertake the work of collecting and tabulating fruit statistics. Some of you will probably remember that at the meeting held, I think, at Hamilton, I presented certain statistics as to the extent of orchards, the number of trees, etc. It was thought by some that these figures were grossly exaggerated, but the more they were looked into, the clearer it became that, instead of over-estimating, we had under-estimated the extent of the industry so far as the number of trees was concerned. I found later that the figures we then put out did not disagree to any great extent with the figures lately put out by the Dominion Census of 1901. For instance, in 1892 the number of bearing apple trees was stated to be 6,637,000, while the census gives the number at 7,081,000. We have found that the Dominion Census, which is a compilation got from the individual



growers, corresponds in the case of apples, pears, plums, peaches, cherries and grapes, fairly well with our figures, which are merely estimates. Our estimate, for instance, of the number of grape vines is 2,174,000, while the census places the number at 2,043,000.

We thought that having for several years estimated the number of trees and vines, it would be a comparatively easy matter to figure out the crops. We have been fairly successful in figuring out grain crops, etc., and thought it would be but a small step to extend the work to fruit. We soon discovered our mistake, however. To illustrate: Here is a man with a ten acre field of wheat. Most of you here on looking at that field would be able to make a fairly accurate estimate as to the number of bushels it would yield, and it would be the same with all other grain crops. After the wheat has been harvested, and the threshing done, and the granaries have been filled, you have a means of verifying your calculations. Everything that was grown in the wheat field is stored in the bins, and there is very little trouble in calculating with fair exactness how much wheat, oats, barley, etc., your farm has produced. If this can be done on one farm, it is simply a question of enlarging your field and you can figure out the crop production for the whole Province. On the other hand, we have here to deal with an apple orchard, and I think you will agree how difficult most of you who are not experts in that line would find it to go into that orchard towards the end of the season and estimate, within a reasonable limit, the size of the crop the orchard will produce. This is one of the reasons why the buying of fruit on the trees is condemned in so many districts, that is to say, it is for the most part very uncertain whether the producer or the buyer is going to make money on the transaction. When, therefore, we have asked farmers to give us their estimates of the fruit crops, we have frequently hesitated about publishing them. Even after we have secured an estimate of the crop on the trees, it is by no means sure how much of that will be harvested. In certain sections—not the special apple growing districts—there are immense quantities of apples which are estimated but which are never taken into the barn or fruit-house, but are allowed to fall and be consumed by the hogs or rot on the ground. For this and other reasons when we take up this question we find ourselves confronted with a serious difficulty. Another point is that fruit crops are not as evenly distributed as are the grain crop and live stock of the Province. You may think that you are setting us a very simple task when you ask us to compile these statistics, but we have found so many difficulties in the way that we hesitated about undertaking it unless we felt sure that it could be done satisfactorily. The necessity and importance of having these statistics we all fully recognize. The question is, can anything be done in this direction, or must the fruit growers depend upon the census figures which are taken every ten years. Perhaps you may say that if they can be taken every ten years at the time of the census, why cannot the Provincial Department do it every year? Some of you may have watched the discussion in the papers as to the cost of taking the last census. If so, you will understand why the Department or the Government of this Province hesitates in a matter of this kind. The cost of taking an annual census where every producer is visited would entirely preclude such a task.

Q.—Would it not be possible to use the county officials, giving them more columns to fill out in the annual assessment?

Mr. JAMES: If you had been up against township councils and assessors for twenty years, as I have, you would know that it is almost a hopeless task. Unless you are prepared to pay them for the work, I do not see

how we could ask the assessors to obtain any further figures. Another great difficulty is this, that while we have a number of very competent assessors, there are some others who are not very competent. We are having the greatest difficulty in getting our municipal statistics, which are comparatively simple. If the assessor had to obtain, in addition to what he now procures, an exact statement of the fruit products of the previous year, I do not think we should obtain reports that would be at all satisfactory or complete.

Mr. ARMSTRONG: I am of opinion that if the assessor in every township was given to understand that he would receive say \$3, which would be a small sum in the aggregate, for this work, it could be done.

Mr. JAMES: I do not think so; \$3 would not begin to pay him for his services.

Mr. W. L. SMITH: It would be a simple thing for him to give the number of trees.

Mr. JAMES: We have that in the census. The question is to find out at the time the fruit man wants to know it, what there is on these trees in the shape of a crop, and also at the end of the season what has been harvested. The assessor could not very well do that. What he would get in the spring when he went his rounds, would be the production of the year previous.

Mr. ARMSTRONG: The object of the resolution is not so much a commercial one as to give the public a fair and honest statement of the extent of the fruit industry in the Province.

Mr. JAMES: I want to give you another point for consideration. I have spent much time thinking over this to see whether it would not be possible to arrive at some satisfactory figures. According to our estimates we have figured that last year there were 7,000,000 bearing apple trees in the Province, and that they produced 31,000,000 bushels. These estimates are made from the farmers' own reports. In the *Mail and Empire* of Tuesday last, you may have noticed an item under the heading of "A Heavy Apple Crop," which stated that one firm in this city estimated that the total crop would approximate 500,000 barrels, which is about 25 per cent. less than a year ago. When you run up against the fact that the actual crop marketed, as given by the wholesale fruit men, is only from 500,000 to 750,000 barrels, and you find from the farmers' statements that the trees carried from fifteen to twenty-five million bushels, you feel completely at sea about it. You come to the conclusion that if there is anything at all reliable in these figures, then the apple orchards of this Province are the most neglected and the least productive parts of our farms. If we have seven million trees producing apples, and this year there are only 500,000 barrels that are marketable, and that last year only 25 per cent. more were marketed, then the waste must be something appalling, and our apple orchards must be one of our great neglected assets.

Q.—Is the difference not due to the San Jose Scale in the southern part of Ontario?

Mr. JAMES: Damage by San Jose scale cuts a comparatively small figure so far as seven million apple trees distributed over the Province are concerned.

Mr. MACOUN: Have you ever considered the advisability of getting the school children to collect the information for the teacher? They might be given blanks to take to their homes and fill out, and the teacher could forward them to the Department.

Mr. JAMES: We have not become acquainted with any workable scheme yet except the plan we have been trying to introduce during the past two or three years. We have concluded that the only way to get the informa-



tion is to send out for it. We know very little about the special crops of the Province, and during last year and this we have been gathering some information on the subject. As a result we have several reports which we intend to publish before long. For instance, a man specially qualified has, during the past summer, been gathering information in regard to the bean crop. He has obtained information that could not have been secured by circular or by any such means. Then we have two or three other reports. We sent a man to one of the townships of East Northumberland to collect information regarding apple growing in that section. Another man has secured information in the canning sections. We have thought that if we could get a resident in each section to take charge of that section and study the crops there, reporting to us on the whole of the crops of the district from his personal observations, we should in this way get the information we require.

If any of you have any suggestions that are workable, we shall be only too glad to receive them, but you will probably find as you think over the matter and the suggestions made, that there are more or less difficulties and objections in the way. Take for instance the suggestion that the school children should do the work. This I fear would be an uncertain method, and would depend largely on the attitude of the teacher. One teacher might look after it all right, and the teacher in the next section would say "There is nothing to be gained by this; I am not paid for it at any rate, and I do not think I will do it." Then take the suggestion to pay the assessor an extra \$3.00 for this work. The assessor goes to every farm house; he has to ascertain the number of apple, pear, peach and other trees, and fill in the amount of the crop produced; the farmer's wife is not in a position to give him the information and has to refer him to her husband, who is away perhaps at a distant part of the farm. When he comes, as likely as not, he cannot give the exact number of fruit trees he possesses, much less the amount of fruit they yielded during the previous season. It does not seem therefore that \$3.00 would be an adequate compensation for the trouble the assessor would be put to in the matter. Then as to the suggestion regarding school teachers, I assume that \$5.00 or \$10.00 would not be too much to pay them for their trouble, but there are over 5,000 rural schools in the Province, which would mean a total expenditure of \$25,000 to \$50,000, which, I am afraid, would be altogether beyond our means.

You may be sure, however, that we are working as best we can, and if we can develop any satisfactory system, we shall be only too pleased to do so. But unless we can assure ourselves that these figures are fairly reliable, we think it far better in the interest of the fruit growers not to publish them at all. We feel that our figures in regard to crops and live stock are accurate, and we are prepared to stand by them, as we can prove them to be correct. But when it comes to fruit we have felt that we had no figures that were really reliable. I am not sure, indeed, whether it would not be advisable for us to withdraw even the apple statistics, as the figures given by the farmers themselves give us so little information as to marketable fruit.

Q.—How do you account for the difference between the farmers' and dealers' estimate of the crop?

Mr. JAMES: In obtaining our information, we send cards directly to the farmers on which certain questions are asked. We send out from 25,000 to 50,000 cards. Say that in a given section there are 150 farmers and from 50 to 75 return to the department the cards with the answers filled in. When they reach us, they are checked over and if any palpable mistakes appear, these are thrown out. From what remains, we estimate the total apple crop.

Mr. A. H. PETTIT: Could not four practical men in each county in the Province give us a comparatively accurate report after the fruit is well set upon the trees. Reports are sent throughout the country as to the prospects of the apple crop for the year, and in many cases these are inaccurate. A man sells his orchard on the strength of the report, and perhaps does so at a loss on this account. What we should like to have is, first, a report in advance of the crop, and second, a report of the total crop after it has been gathered.

Mr. JAMES: That is to say you desire an estimate of the crop before the prices are fixed in the market.

Mr. PETTIT: If it is to benefit the fruit growers.

Mr. JAMES: If instead of depending on the individual farmer to make reports, we could afford to keep permanently employed in the different sections, men who would make it their business to collect these reports for us, I think we could get good information, but it would be an expensive method. Supposing we had a correct estimate early in the season, what would be likely to be accomplished by it?

Mr. RICKARD: I do not think it would be of very much aid to a man in selling his fruit unless we knew something about other countries also, and the world's supply and demand, as these are factors which enter largely into the question of prices. It makes very little difference how many apples you have in Ontario as to what the price will be. It is such a far reaching question that unless you can present all the statistics on the subject, you have very little to go by.

Mr. W. L. SMITH: You could get the reports to which Mr. Rickard refers from the American Consular Reports and through the commercial agents in Great Britain.

Mr. JAMES: One hesitates sometimes about accepting some of them unless we know that their source of information is considerably better than the one upon which we are forced to depend.

Mr. SMITH: I have watched these reports rather carefully for the last four or five years and as a rule have found them to be fairly accurate.

Mr. JONES: I think that if two or more men in each district could make an estimate of the fruit in the orchards, it would give you something of value.

Mr. CASTON: I do not think you will get any better system than the one employed already. There are practically only two railway systems shipping apples in this country. From them we might get a statement of the shipments to the Northwest and abroad, so far as apples are concerned. But there is no single product of the farm that is so largely consumed locally as the apple crop. We have six incorporated towns for example in the county of Simcoe. These people consume a large quantity of apples, and they are supplied by the farmers direct. The shippers' estimate to which Mr. James refers of course takes no account whatever of the fruit required to supply this demand all over the province, and this I think goes a long way to explaining the apparent discrepancy.

Mr. BUNTING: I think we appreciate the difficulties under which the Department is laboring, and their desire to procure the information required. It seems to me that the first thing is to get accurate information as to the number of trees of the different varieties of fruit in each county. That could be provided by the method suggested, that is to say, through the assessor's list, if the question of compensation could be arranged. As to the obtaining of the aggregate output during the fruit season, that could be provided for by appointing two or three men in each county to estimate the crop. I should like to call the attention of the meeting to the fact that



we have here a gentleman from New York State Experiment Station, and that they have instituted an apple survey whereby they arrive at an estimate of the crop.

Prof. PARROTT: In New York State, Cornell University instituted a survey in three of the leading apple sections, but in no case have they made an endeavor to get all the data necessary for the entire county. They simply take different districts that are representative of the county. This work has been done entirely from the standpoint of getting the actual number of trees and the amount of the crop produced, the idea being to determine what varieties have proven most remunerative, what pests are most destructive, and also the relative profit from apple trees grown in sod and otherwise. In Walters township, Wayne County, they have actually visited every orchard and obtained the number of trees in each, including apples, pears, cherries, plums and quinces. They have also endeavored to get the ages of the trees, the number of varieties, and the value of the fruit yields for the last five years. I have some doubt as to the value of the data thus given as to crop yields, as at best it is only an approximation. Take the case of our San Jose scale work, in connection with which we leased eight of our experimental orchards. We found it almost impossible to get the fruit yields for two or three years back.

We are undertaking to make another survey in which we are soliciting the co-operation of the orchardists in Ontario County, the one in which the experimental station is located. This fall we formed our organization, and I think it is going to be one of the banner apple associations in the State. An exceedingly large percentage of the growers attended the first meeting. From the members of the organization we are going to try to get the data we want. Each man will visit the orchards in his community of those who are not members of the association, and will fill out blanks as to the number of trees, the varieties of fruit, ages, pests and crop yields.

I think the value of the reports to the state regarding yields, does not amount to much so far as the marketing of fruit is concerned, unless there is very close co-operation with all the other States of the Union. It does not help the apple growers of New York to know what their fruit crop is, unless they know what has been produced in the other States as well. Before the reports have any great value in aiding the marketing of the crop, it is necessary that there should be close co-operation with other states. During the past summer it was reported in New York State that there was only 60 per cent. of a crop. Farmers were advised to hang on to their fruit, and reports were spread that in other states the crop was small. As a matter of fact I have information that in Missouri, Iowa, Illinois, and some other states in the central district, the crop is an unusually large one.

Mr. RICKARD: I think that the most effectual way of getting at the number of trees would be through the assessors or through the local municipal government. If you have an apple-growing municipality like the township of Clark or Darlington, or any of the fruit townships of Northumberland, it is worth something to the people to know these things, and if the local municipal government takes the proper view of it, they will be willing to aid the assessor to secure the information. If it is a municipality where there is very little fruit grown, there would be very little work to do and it is not so important.

Mr. PEART: I should like to see this resolution or a similar resolution passed by the meeting so as to draw the attention of the Government to the matter. We are making no recommendation as to the method of procedure, but simply asking for further fruit statistics in detail.

Mr. JAMES: If the assessment roll is to be enlarged by the addition of these columns, it can be done only by special legislation. It should, I suppose, receive its initiation through a representative body of fruit growers such as this.

Q.—What procedure would you suggest?

Mr. JAMES: One way would be to ask the Government at the next revision of the Assessment Act to provide columns in the assessment rolls for the collection of such data regarding fruit trees as may seem desirable.

The Chairman then put the resolution to the meeting and declared the same carried.

On the resolution of Mr. PEART, seconded by Mr. MURRAY PETTIT, the following were appointed to deal with the matter: Messrs. W. H. Bunting, Murray Pettit, and A. W. Peart.

## REVISION OF THE CONSTITUTION.

The Secretary presented the following report from the Committee on Revision of the Constitution:—

Your Committee beg to report as follows:—

Clause 1.—Add after the word "Ontario" the following: "And hereafter in this Constitution shall be referred to as the Ontario Association."

Clause 4.—Insert the word "Financial" after the word "Association."

Clause 12.—After the sentence ending in the words "Annual Report," add the following: "He shall call the first meeting each year of the new Board of Directors within six weeks after the end of December."

Clauses 7, 8, 24, 25, 26, 27 and 28 shall be cancelled and the following substituted:—

7.—The election of directors shall take place in December of each year at Board meetings of the affiliated associations, as defined in Clause 28 governing affiliated associations.

8.—The newly elected directors shall, at the first meeting of the Board, appoint from among their number, a President and a Vice-President, and from among themselves or otherwise a Secretary-Treasurer.

24.—Fruit growers in any section of Ontario may form a local association, which, later, may become affiliated with the Ontario Association on the condition defined in Clause 26.

25.—It shall be the duty of the officers and directors of the Ontario Association to encourage the formation of such local associations.

26.—Any local association may affiliate with the Ontario Association when it has a membership of ten, upon the payment to the Treasurer of the Ontario Association of \$5 for the first 25 members or fraction thereof above nine, and 25 cents per member for every additional member, which payment shall entitle the members to all the privileges and advantages of membership in the Ontario Association, including representation on the Board of Directors upon the terms defined in Clause 28.

27.—Fruit growers, who are members of two or more local associations shall be accepted as members of the Ontario Association from that branch association only which is the first to forward their membership fee to the Secretary-Treasurer of the Ontario Association.

28.—The directors of each affiliated association shall, during December of each year, appoint a director of the Ontario Association as follows:—



(a) Any association having ten members or over shall appoint one director, whose expenses when attending meetings of the Board shall be paid by the Ontario Association.

(b) At all Board meetings of the Ontario Association each director present representing any branch shall have the right to cast one vote for every twenty-five members or fraction thereof of his branch who are members also of the Ontario Association.

The proposed amendments were then taken up for discussion clause by clause. Section 1 having been passed, the clauses relating to representation on the Directorate of the Association were discussed. A number of views were given expression to in this connection.

Mr. W. L. SMITH was of the opinion that a local fruit growers' association should be organized in each electoral district. These associations should each send a delegate to the convention. These delegates would form the Provincial association, and they should, from among themselves, elect a board of directors.

Mr. CASTON contended that district representation must be preserved, and that where there was no local association the horticultural or agricultural society for the county should nominate a representative.

Mr. LICK stated that the one thing certain was that the directors must be elected by members of the Ontario Association and not by members of agricultural societies. He would give each paid-up member of the district associations one vote for a director for that district, and the name of the person elected should be forwarded to the secretary of the Provincial Association.

Mr. ROBERTSON, of St. Catharines, recommended that representation should be proportionate to the membership of the local associations, as the importance of the industry in any given district should be taken into account.

Mr. SMITH moved the following resolution: "That the Ontario Fruit Growers' Association shall consist of delegates elected by the local association, one such association to be formed for each Electoral District in the Province, and that these delegates shall elect in convention the officers and directors." Mr. ROBERTSON seconded the resolution.

Mr. W. E. WELLINGTON stated that a special committee should be appointed to deal with the matter. In his opinion the districts should be allowed to remain as at present; that each district should have at least one representative, and the number should be increased where the importance of the industry warranted it. This would give a representative meeting, and from among those present the directors should be elected by ballot.

Mr. LICK stated that most of the objection to the old method was on account of the directors having their travelling and other expenses paid while at the convention, which gave them an undue advantage.

Mr. BUNTING thought it desirable to do away with the practice of paying directors' expenses, although it might work some hardship in the case of those who had to come a great distance. He would suggest paying their expenses to business meetings, but not to the annual convention. In order to get a more representative board he suggested that each association elect its representative by ballot.

Mr. R. B. WHYTE, Ottawa, stated that in his district it would be practically impossible to form an organization, and that therefore it would be left without representation. He agreed with Mr. Wellington that the matter should be dealt with by committee. He therefore moved in amendment that the matter be referred to a committee consisting of the following: E.

Lick, H. Jones, W. L. Smith, G. A. Robertson, W. H. Bunting, D. Johnston, E. Morris, P. W. Hodgetts, and that the committee report to the convention at the earliest possible moment.

Mr. Smith, having withdrawn his resolution, the amendment became the original motion, and was put to the meeting and carried, and later the chairman of the committee, Mr. Lick, reported that all were agreed on the following principles: first, to leave the districts as they were at present; second, that each affiliated association having ten members should be admitted to membership in the Association; that the fee should be five dollars up to twenty-five members, and twenty-five cents for each additional member; that each affiliated association should send one delegate, and that for every twenty-five members after the first twenty-five, they should be entitled to an additional delegate, whose railway expenses to the annual meetings should be paid by the association.

Mr. LICK moved the adoption of the report and was seconded by Mr. MURRAY PETTIT.

Mr. THOMPSON moved in amendment, seconded by Mr. ARMSTRONG: That the Constitution be so amended as to provide that no director should hold his position for more than three years consecutively.

In the discussion that followed it was pointed out that this would result in the immediate loss of all the old directors, and the opinion of the meeting appeared to be that it was in the best interests of the association that changes in the directorate should be made gradually and with discretion.

Mr. WHYTE moved in amendment to the amendment, seconded by Mr. ARMSTRONG, that the four oldest directors be dropped off each year, and that four new men be elected to take their places, but that those dropping out should be eligible for re-election after the lapse of one year. Mr. Thompson having withdrawn his amendment, the chairman then put Mr. Whyte's amendment to the meeting, and the same was declared carried.

Mr. BUNTING moved, seconded by Mr. JONES, that the report as amended be adopted.

Mr. CASTON stated that he was strongly of the opinion that the local associations should nominate and elect their own directors for the reason that those nominated were often unknown to the general meeting, and could not be voted upon intelligently.

Mr. THOMPSON also endorsed this view.

Mr. LICK moved in amendment, seconded by Mr. WHYTE, that the report be laid upon the table until after the election of directors had taken place.

The Chairman, having put the amendment, declared the same lost.

The motion to adopt the report as amended was declared carried.

The amended Constitution will be found at the end of the Report as "Appendix B."

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## ADDRESS.

By HON. NELSON MONTEITH, MINISTER OF AGRICULTURE, TORONTO.

I am sure that it is with much pleasure that I have listened to the discussion in reference to peach growing. Much as that industry represents in this Province, we have still greater interests in the fruit line. These are days of changing conditions among us. Population is flocking to our large centres, the ever-increasing needs of the community are becoming more



apparent from day to day, and I believe that the fruit growing industry is something that bids fair to profit from this condition of things, more, possibly, than some other lines. I am glad that the fruit growers come together here from year to year to consult as to the best methods whereby this great industry may be fostered.

One thing has struck me very forcibly, and that is the apparent decadence of the apple industry, at least in some sections of our Province, and the lack of attention which is so noticeable in many of our orchards. This may not have impressed some of you so much as it has impressed me, because the majority of you come from districts where fruit growing has become a leading industry, and not merely one of the side lines of agriculture. There is, however, a great district in the western portion of the Province, and to the north of that, where the industry has apparently lost its influence upon the grower, and I believe that this Association should try to do a little missionary work in these sections. We should either get rid of these orchards or else put them into proper shape in order that they may be made productive and a source of revenue. Not only so, but I think the importance of combating the various diseases and insect pests to which fruit growing is heir should be impressed more and more upon the grower. Those of you who are represented here are looked upon as the cream of the fruit growers of the Province. You have been successful in the business, and you come here from year to year to profit by each other's experience; but the fact remains that the great mass of the people are untouched by this Association.

What has impressed me, and no doubt has impressed a great many of you also, is the opportunity fruit growing presents for making farm life more attractive. As I stated at the outset, conditions are changing. The flocking of the people to the cities, and the filling up of the west, is telling heavily upon our rural districts. What is wanted is something to make country life more attractive to our boys and girls, and thus maintain the even balance that is so necessary for our political and social well-being. It appears to me that the varied lines of fruit growing present some of the most attractive features known to rural life, and I think you have a great mission to perform in keeping these ever before the public mind. Our agricultural publications are doing much to popularize fruit growing, but much still remains to be done.

We are glad to have with us Prof. Parrott and Mr. Hale from the neighboring republic to discuss with us some of the methods adopted in that progressive land. Ontario is one of our banner provinces in the line of fruit production. It has a large territory to supply, but through our recent methods of co-operation in packing, the grading of our fruit, and the advanced legislation dealing with the matter, we believe that we shall be able to maintain our reputation both in the home and foreign market.

I would leave one thought with you, a thought that is possibly well-known to you, and that is that there never has been a time in the history of this country when quality counted as much as it does to-day in every line of production. We are having times of prosperity, and the people are willing to pay for a good article. To supply it should be the ideal of the producer in all lines of agriculture.

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## LOW-HEADED PEACH ORCHARDS.

BY CHAS. F. HALE, SHELBY, MICHIGAN.

While I have had experience with low-headed peach trees, and am prepared to advocate them, I do not know that I ever saw the topic presented to an audience before, and I hardly know what I am expected to say on the subject, nor do I know what you consider here to be a low-headed peach tree. We have in our section trees that are headed all the way from 6 inches to 5 feet. The man with the latter thinks they are low enough; while he who has them headed at 6 inches says they are none too low. I have had about eighteen years' experience in growing peaches, and will give you my own experience. They call me a fruit crank because I love the business and make a specialty of it—not only of peaches, but all kinds of fruit that we can grow—and nothing gives me greater pleasure than to spend my time talking about fruit. What, may I ask, has brought up the discussion of this question? If there is need to discuss it, it evidently shows that some of you have had trouble with high-headed peach trees or the subject would not have been presented.

In planting out an orchard I would head the trees where I want them to start, and this would be at about 18 inches from the ground. If I deviated from this, I would head them still lower. A few years ago we considered that about 2 1-2 feet was the right place to head the trees at the start, but we have found from experience that it costs more to carry these trees to a bearing age, and to spray them and to pick the fruit than it does with those that are headed lower, and expense is the great item for consideration.

In starting trees at that height I would endeavor to head them with not more than four limbs, if possible branching out in different directions, not all from the same point on the tree. I would have the highest branch not more than 18 inches from the ground and the others below. These branches form the start. At the end of the first year, I would practice heading back. I would at no time have the centre of the tree higher than the branches on the outside. It costs more to prune them when you have to send a man up a ladder to do it; the same with spraying the orchard. If you have to have something raised on which to climb to spray the trees, it is more expensive, and besides you cannot do as thorough work, and so in picking. Then, too, your trees are much more likely to break down with snow and storm if they are headed high, owing to the fact that you do not get that short, stocky growth but a spindling, willowy growth. We used to think that an ideal orchard was one headed so high that you could plow and cultivate right up to the tree trunks, but the fruit never did so well. It is natural for the peach tree to grow low. These are the main reasons why I would head a tree low and why I would keep it low. We prefer to have our trees 20 ft. apart and we keep them cut back so that we can reach them and control them. They are stocky trees and stand the winter well.

As to peach culture, I do not know your practice here. We practice thorough cultivation. We do not believe in sod methods. We have run across gentlemen from some States who tried to preach that to us, but we did not take to it kindly. If you want a good thrifty peach orchard or any other orchard, we consider that good thorough cultivation is just as necessary as in the corn field. In starting an orchard our practice is to grow some hoe crop in the orchard for two or three years. We have not found this detrimental, at least for two crops, if the ground is in any kind of condition when the orchard is set out.



Q.—What do you mean by thorough cultivation? How long does it extend through the season?

A.—At least till the first of August.

Q.—Do you put any cover crop on the soil?

A.—Yes. As a general thing we use oats more than anything else. We have tried cow peas and other crops, but at the present time oats give the best results.

Q.—What implements do you use to reach under the low-headed trees?

A.—We use the plow and drag, that is about all. You can so arrange your plow or set it that you can put your team off to one side and plow closer to the tree than you think you can. Another thing, if the trees are low-headed, grass and weeds will not grow as rapidly near them. Then I take a common strong drag and zigzag around the tree with it.

Q.—Give us your method of pruning from first to fifth years.

A.—As a rule I cut back from one-half to two-thirds of the growth each year, beginning with the first year; perhaps more the first year. I have trees that made from three to five feet of growth the first year. I would cut them back to within a foot of the trunk.

Q.—How much thinning or pruning would you do before the trees commence bearing?

A.—The first year I would cut out nearly all the growth.

Q.—At what season?

A.—As early in the spring as possible. I do not know that there is any difference in the season, but, I think, if anything, that when the sap begins to start is the best time; but we cannot get through all our pruning then.

Q.—The third year do you pick the small fruit out in addition to thinning the branches?

A.—Yes. Every season after we get through pruning, we start to thin the fruit, and you would think if you saw us that we were doing our best to spoil the crops. After the tree is bearing we thin the fruit from 6 to 8 inches apart as a rule; at least we give this instruction to our men, and it is a good plan to keep away from the orchard while this work is being done, so that you may not change your mind.

Q.—Do you thin all varieties the same?

A.—There are some varieties that are shy bearers, and it is not necessary to thin them at all, but the heavier bearing trees should be thinned: Elbertas for instance are not apt to need very much thinning, while Golden Drop needs a great deal.

Q.—In the Siberian varieties have you ever tried to counteract the sterility of the blossoms, thus securing a larger crop of fruit?

A.—I do not know of any method that has been successful. They are of very fine quality but we have never found any method by which we could make them productive.

Q.—If you thin your fruit from 6 to 8 inches apart, how many bushels would be considered a good crop?

A.—From 3 to 4 bushels; but from 2 to 2 1-2 is a good average crop.

Q.—What fertilizers do you use?

A.—That is something we disagree on. Some use commercial fertilizers and some use legumes. If we cannot get anything else, commercial fertilizer is mostly used. I do not think any of us could answer the question positively. One year we think we have found it all out, next year, conditions change and we find we know little about it.

Q.—How do you prepare your land for planting?

A.—Just as you would for a corn crop.

Q.—Would you take a piece of sod land?

A.—If I wanted that piece of land I would, but it is not so easy to take care of the first year.

Q.—Give us a list of the varieties that have done best in your section.

A.—I can cut them down to a very few. When I first went into the business I had about 25 varieties. I planted about 5,000 trees during the last two years and they consisted of St. John, Conklin, Engol Mammoth, Elberta, New Prolific and Smock. Golden Drop has been planted very largely for canning purposes, and Kalamazoo and Bronson Seedling. They are very similar and ripen at about the same time. Conklin ripens at about the same time as Crawford. Of Elberta, 50 per cent. of the trees set out in the last three or four years have been of this variety. I class Elberta with the Ben Davis apple and the Keiffer pear. I do not think either of them are worth eating, but they market well.

Q.—How do you treat the borer?

A.—Dig him out. With low-headed trees where the branches grow low to the ground, I find we are not troubled one-tenth as much with borers. This is a point I intended to mention. Borers do not like to work in the shade. We are hardly giving a thought to borers any more. I have a young orchard two years old; I looked the trees over for borers this year and did not find a single one. I have heard many say the same thing.

Q.—How old are these low-headed trees?

A.—I have orchards six years old and no borers, that is none to speak of.

Q.—Not even the pin borer?

A.—No.

Q.—Do you think a man is likely to be bothered with borers unless he plants them?

A.—Yes, I do.

A MEMBER.—Lots of men plant them but they think they do not.

Q.—What would be the average height of the trees in this six year old orchard?

A.—Not over 10 feet.

Q.—What distance apart do you plant?

A.—From 18 to 20 ft.

Q.—Does not the greater distance tend to make them low-headed?

A.—Yes. If they are crowded, they have to go somewhere and they go up.

Q.—At six years old how close do they come together?

A.—They will come right together. The lowest limbs on these trees will start 1 1-2 feet from the ground. We are heading lower now than then. By practising the pruning back system, the lower branches are not so apt to die.

Q.—Have you tried the Oceana Peach?

A.—This peach originated within a few miles of where I live. While I am not raising it, I have seen some very nice specimens. I do not think it is as good as some of the other peaches, but is a very nice late variety.

Q.—Your heading back the lower branches forces new wood up in the body of the trees, does it not?

A.—Yes.

Q.—Are you growing the Dewey?

A.—I planted some, but would not again. They were supposed to be free stones when we got them. They are a very nice peach for an early variety, but at the same time I would rather have a white peach. They sell just as



well. We have a variety called the Davidson which is a very fine white peach and a heavier bearer. They are fairly free and the peaches are nearly as large again as the Dewey.

Q.—What about Engol Mammoth?

A.—It is one of the best.

Q.—Is it a larger peach than the Crawford?

A.—No, about the same size. The old Crawford peach is apt to have several large specimens and a lot of smaller ones. Engol Mammoth is more uniform.

Q.—What is your objection to the Late Crawford?

A.—It is a very shy bearer.

Q.—Have you a light sandy soil?

A.—Yes, a light loamy soil.

Q.—Is the Dewey free from rot?

A.—No.

Q.—I suppose you spray with bluestone in the spring?

A.—I spray everything in the fruit line.

Q.—Do you find that spraying with bluestone stops curl leaf?

A.—Yes, it will do so. With this object you should spray as soon as you can get on the ground. I would not use the Bordeaux, but just the bluestone without any lime, 2 1-2 to 3 lbs. to 50 gals. of water. We give but one spraying for curl leaf. I know many men who spray and then say it does not do any good. But they are not thorough. I have heard the remark made here this afternoon that you could not control the codling moth by spraying. Now, I know that you can. I have seen it done a good many times, so that you will have almost 90 per cent. apples. But if you leave a part of the tree or a branch, I do not care how small it is, the work is not done thoroughly, as it must be if the pest is to be controlled. I remember that twelve years ago, after I had practised spraying for three or four years, I thought I was a pretty good hand at it. One day I heard Prof. Taft say, "Be thorough." In talking with him after the address I said, "There is one question I want to ask you. I want you to beat it into my head so that I will know what the word 'thorough' means. I have heard what you have said about thorough spraying, and I thought I had been doing it, and yet I have not got the results you guarantee we can." He said "I will try and explain what I mean. I had a class of boys at the College and sent them out to do some spraying with lime. I had impressed on them that I wanted a good thorough job done. They reported after a time that they had done it and I went to inspect. It looked all right, but I found on close examination that on one side a small part of one of the branches was not covered. I said, 'Boys, if you had covered that you would have done a thorough job.'"

Q.—Have you the San Jose scale?

A.—Not in our immediate vicinity, but we have it in Michigan.

Q.—You do not have to spray for it then?

A.—Not yet, but we shall come to it.

MR. ROBERTSON: Those who have sprayed with lime and sulphur for scale claim that it is just as effective in curing curl leaf.

Q.—How do you treat the codling moth?

A.—Seasons differ greatly, and climatic conditions are different. One spraying will not do it, two sprayings will not do it; some years it may, others it will not. This year in our vicinity we had a dry season and we had no fungus and no scabby apples, and on that account some of us neglected some of the later sprayings. Up to August first the apples were smooth and nice, then the second brood of the codling moth got in its work; but there

were some orchardists who did their spraying as usual, and they have not more than 10 per cent. of wormy apples.

Q.—When did you give the last application?

A.—From the first to the 10th of August.

Q.—What do you use?

A.—Just Bordeaux mixture with arsenic of some kind in it. We use Paris Green mostly.

Q.—How much Paris Green?

A.—About 1-2 lb. to 50 gals. of Bordeaux mixture.

Q.—Do you grow sweet cherries?

A.—Yes.

Q.—Do you head them low?

A.—Yes.

Q.—Do you think they can be headed low and grow successfully?

A.—I do not know why they should not do so.

Q.—What distance do you put them apart?

A.—16 feet on an average for sweet cherries, and we are heading them as close to the ground as we can.

Q.—Have you had any trouble with the larger branches healing over after pruning?

A.—I never had any trouble.

Q.—Can you control fruit rot by spraying with Bordeaux in a wet season?

A.—I cannot.

Q.—Did you ever hear any one say they could?

A.—Yes, I used to say so. A man may have good results one year, but the next year it will be a failure. A few years ago I would have told you on my word of honor that I could control it. I tell you now that I cannot. On plums it is very troublesome. I never had any rot on them until two years ago; then they just wilted right down. That is an exception of course. I think spraying helps it.

Q.—Have you practised low-heading in other trees?

A.—We are heading all our trees lower than we used to. Apples are being headed about 2 1-2 to 3 ft. from the ground.

Q.—What is the cost of pruning a peach tree until it is six years old?

A.—If it has been pruned every year, it would cost much less than if the pruning had been left until the sixth year. If the orchard is six years old and has been pruned every year and it is a thrifty, healthy orchard, allowing from 12 to 15 trees per man per day, and paying him \$1.50 a day, we can form a very good idea. Some men will prune 30 trees a day, but this is an exception.

Q.—Do you head back your side limbs immediately?

A.—Yes.

Q.—Where do you get your help for thinning?

A.—We cannot get one-half the help we need in Michigan. Not one-half the pruning has been done the last two seasons that would have been done if help could have been had.

Q.—In starting your peach orchards do you advocate cutting off all the side branches and laterals that are on the trees coming from the nursery rows, thus reducing them to a whipstock?

A.—Yes.

MR. ARMSTRONG: I should like to say that this is not my practice. I think I have something better. I agree with you in regard to the height. My practice is to trim everything off to about 12 in. to 24 in., but to leave



4 or 5 of these short limbs that were growing one year in the nursery, heading them back to the bud, for the reason that if you leave four or five of these little arms on the old stock and start your bud from one of these arms, you will have a stronger growth because it is one year older.

A.—I would follow that practice with large trees, No. 1's as we call them, but if you are planting the slender, smaller trees, they have not got as many laterals, anyway, and by cutting them off and allowing the bud to start from the tree, you can get it better where you want it.

Q.—We find that nurserymen have the habit of cutting off these small limbs for the purpose of lengthening the height of the tree.

A.—That is where we have to educate them a little. We should refuse to take these trees.

Q.—At what season of the year do you prefer buying your trees?

A.—If I am dealing with a nurseryman who has a good place in which to winter his stock, I would prefer that he should winter them and let me take them in the spring.

Q.—Does he dig them up or leave them in the nursery row?

A.—Digs them up.

Q.—What aged stock do you use?

A.—One year old stock.

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## THE SAN JOSE SCALE, ITS LIFE HISTORY, SPREAD AND REMEDIES.

PROF. P. J. PARROTT, NEW YORK AGRICULTURAL EXPERIMENT STATION,  
GENEVA, N.Y.

As I was examining your beautiful exhibits of orchids, carnations and chrysanthemums, and your extensive collections of fruits in Massey Hall this morning, it occurred to me what a pity it was that it is necessary at this time to discuss such obnoxious pests as bugs and plant diseases. But as there is good and evil in the world, so there is sound and bad fruit, and a large part of the bad fruit is due to the ravages of insects and fungi. Perfect fruit can hardly be grown to-day unless efforts are made to control these enemies. The insects especially play an important role in human economy; and if you are a reader of current events, you cannot help being impressed with the rapid strides that the study of insects has taken among the biological sciences and its important relation to public health and prosperity.

Within the past few years attention has been directed to the ravages of the boll weevil in the cotton fields of the south, the disease-disseminating mosquitoes on the sea coasts, the threatened invasion of California by the Mexican orange worm, the destructive work of the Gypsy Moth and the Brown Tailed Moth in the parks and woodlands of New England, and the appearance of the San Jose Scale into the principal fruit-growing areas of Canada and the United States. All these are insect problems of national interest and their solution is of vital importance to those communities directly affected by them. There was never a time when so much attention was being directed to the study of destructive insects, and never before has so much money been spent to control them. On the other hand there never was a time when our fruit growers were so well equipped with insecticides

and spraying machinery to hold these pests in check. There is hardly an insect pest but what will yield to scientific treatment. This holds true with the San Jose Scale, which at this time is of so much concern to you.

**ITS HABITS.** Now to fight an insect successfully we should be able to recognize it and should know its life history, and the particular stage in its life when it is most susceptible to treatment. Success in fighting insect pests is often determined by this knowledge. The scales constitute a peculiar group of insects which differ in many ways from the active and highly colored forms usually familiar to the casual observer. They are very inconspicuous because of their small size, dull colors and sedentary habits. This is especially true of the orchard species, for they so closely resemble the bark of the trees that at first glance they appear to be a part of it. Failure to recognize the insect and its work may result in irreparable injuries to an orchard.

First of all then, let us consider the nature of the San Jose Scale and its habits, which are well illustrated by the models at hand. These represent the development of the San Jose Scale, which agrees in many respects with that of other common orchard species. Here we have a representation of the young female scale, or mite, much enlarged, which on being born is a microscopic six-legged animal, yellow in color and exceedingly active. This has, as you may observe, many of the parts that characterize a typical insect, which are one pair of feelers, three pairs of legs, and a sucking bill or proboscis, by means of which it obtains its nourishment. Within a few days after its escape from the mother scale, it settles down upon a suitable place and thrusts its beak through the bark into the sap upon which it subsists. Soon there emerge from pores in its body waxy filaments, which gradually become compacted forming a white coat or the first scale. As the insect grows it sheds its skin, which becomes attached to the scale. This appears as a yellow colored nipple-like prominence in the center of the San Jose Scale or at the smaller end of the scale of the oyster-shell, bark-louse, and the scurfy bark-house. In this first molt the female loses its legs, feelers and eyes, but unfortunately she retains the sucking bill. With increase in the size of the body, there is a corresponding enlargement of the protecting scale by the excretion of a waxy substance to its margin. The mature female appears as a wingless, footless, eyeless, grublike creature, as you can observe, which never moves from the spot where she first attached herself as a mite, and which is concealed from the light by a shield or scale of her own excretion. This grub, much enlarged, is the insect herself and this scurfy, filmy body is her protective covering which is composed of the cast-skins and waxy substance from the insect's body. Hence the name, scale insect. After the approach of the male in pairing time, the female enters upon her period of reproduction, at the end of which she dies. The number of offspring varies with the individual, sometimes running up into the hundreds. As there are several broods during one growing season, one female surviving the winter may be responsible for hundreds or even millions of offspring. The male in his early history closely resembles the female, but forms a scale quite different in shape. After the second molt marked, changes take place in his body, and rudiments of external appendages develop; and later when mature, he appears as a small fly, with a pair of wings, by which approach to the other sex is made possible.

**REMEDIES—SOME PRINCIPLES.** Broadly speaking, insects may be divided into two classes, first, those that have distinct jaws, by which they are able to bite off or gnaw off small portions of leaves, bark or wood of a plant; and second, those with mouthparts shaped to form a bill or sucking beak, which can be thrust into the layers of bark or leaves to the underly-



ing tissues and used to suck up the plant or plant juices. The former are controlled by coating the plant attacked with some poison such as Paris Green or London Purple, or other arsenical sprays, so that some of the poison may be included in the food of the insects, while the latter, because of their peculiar manner of feeding, cannot be killed by poisons, and to be destroyed, must be coated with some substance that will clog or seal up the breathing organs, thus choking it to death. The sprays that accomplish this end are called contact remedies.

The scales are sucking insects, but because of their peculiar habits, and wonderful reproductive powers they are more difficult to control than many insects obtaining food in a similar manner. To successfully control the San Jose scale, requires very careful and thorough spraying, that all individuals may be coated with the spraying mixture. If this is not done, the specimens escaping the treatment will live to produce an enormous number of young to infest the tree again. One of the most discouraging features in fighting this pest arises from this very cause. Often the spraying is so imperfectly done, that the offspring from the surviving are numerous enough in one season to make up for the numbers destroyed. In this event little benefit has been derived, and another treatment must be made to prevent the rapid increase and spread of the scale, and to save the trees. To careless work, rather than the kind of spraying mixture used, may often be assigned the cause of the failures to control the scale. The successful treatment of this pest calls for intelligent and persistent spraying. Learn to recognize the scale, know its life history, and follow closely the instructions for the preparation and application of the standard spraying mixtures. The degree of success that will attend your efforts depends to a large extent upon the use that is made of that knowledge.

**METHODS OF CONTROLLING THE SCALE.** The San Jose scale is rapidly spreading into our leading fruit growing sections of New York. In those communities where it is well established, annual spraying for the scale is practiced by the more progressive fruit growers. The orchardists experienced in this work are fighting the scale efficiently and profitably upon peaches, plums, pears, and apples of moderate size. The spraying mixture which gives the most satisfactory results on scale is the boiled lime-sulphur wash. This is used by the larger number of our fruit growers, although some are using the proprietary miscible oils or mineral oils, either clear or emulsified. The lessons our fruit growers have learned from their own experience and the methods that they have developed in fighting the scale to meet their own individual needs, are soon taken advantage of by fruit growers in other communities, where the appearance of the scale is of more recent origin; so that now there is usually not that unnecessary destruction of the trees while the orchardists is familiarizing himself with the proper methods of fighting this pest, as used to be the case. Our successful orchardists are much alarmed at the spread of the scale and are prepared to protect their trees as soon as any infestation is detected.

There is one phase of the scale problem that is not satisfactory, which is, that the spraying of old apple orchards has not usually been successful. In many localities where the scale has been longest present, there are orchardists complaining that it is impractical to spray old orchards for the scale as it has been impossible for them by known methods of treatment to keep the trees in a sufficient healthy condition to produce clean and profitable crops. Disheartened by the poor results attending their efforts, certain of these fruit growers are now neglecting their trees which are dying, thus eliminating one of the principal sources of income of the farm. To protect the old orchards is the remaining important phase of the scale problem.

A BUSINESS EXPERIMENT IN AN OLD APPLE ORCHARD. To ascertain the difficulties encountered in spraying large trees, and to determine if there are practical methods of protecting commercial apple orchards, the Geneva Station is co-operating with a number of fruit growers in the treatment of their orchards, special attention being given to old trees. The details in the experiment at Mr. Dutton's orchard at Youngstown will be of interest to you. This orchard has an extent of twenty acres, consisting of 598 trees of at least forty-five years of age. The varieties represented, and the number of trees to the variety are 380 Baldwins, 135 Greenings, 40 Spitzenburgs, 16 Kings, and some summer kinds. The rows are numbered from east to west. There are twenty-eight rows and there are twenty-three trees to the row.

HISTORY OF SCALE IN THIS ORCHARD. The scale was discovered in 1900 on one Greening, and in 1903 it was more or less distributed throughout the orchard. In 1904 the crop of Greenings in rows 2-6 inclusive, were badly spotted, and the bark of the trees was much incrustated. Some trees were so severely injured that many branches and occasional limbs were dying. The Spitzenburgs, rows 7-8, and Baldwins, 9-11, showed conspicuous spotting of the fruit. The remainder of the orchard, with the exception of some trees along a ditch, running irregularly through rows 13-17, was to a large extent clean, only a little fruit having scale blemishes.

EXPERIMENTS IN ORCHARD. In 1905, crude petroleum was applied to 207 trees, boiled lime-sulphur wash to 345 trees, and kerosene-limoid to 47 trees. Items of expense for spraying orchards were as follows:

#### COST OF SPRAYING APPLE ORCHARD IN 1905.

##### *Crude Petroleum.*

Twenty barrels of crude oil @ \$4.60 .....	\$92 00
Three men for three days @ \$1.50 .....	13 50
Team for three days @ \$2.00 .....	6 00
Wear on sprayer (2½ per cent. of cost) .....	11 25
<b>Total .....</b>	<b>\$122 75</b>

Number of trees sprayed, 207.

Cost of oil per tree .....	44
Cost of labor and team per tree .....	9
Cost of treatment per tree .....	59

##### *Boiled Lime-Sulphur Wash.*

3,750 gallons of sulphur wash:	
1,125 lbs. sulphur @ 2½c. ....	\$30 94
1,500 lbs. lime @ 45c. per cwt. ....	6 75
Fuel .....	3 00
Four men for five days @ \$1.50 .....	30 00
Team for five days @ \$2.00 .....	10 00
Wear on sprayer (2½ per cent. of cost) .....	11 25
<b>Total .....</b>	<b>\$91 94</b>

Number of trees sprayed, 345.

Cost of sulphur wash per tree .....	12
Cost of labor for making wash per tree .....	02
Cost of labor per tree .....	10
Total cost of treatment per tree .....	27



*Kerosene-Lime Wash.*

1,000 gallons of kerosene-lime wash, 25 per cent. oil:	
250 gallons of kerosene @ 10c. ....	\$25 00
1,000 lbs. lime @ 50c. per cwt. ....	5 00
Four men for 1½ days @ \$1.50 .....	9 00
Team for 1½ days @ \$2.00 .....	3 00
Total .....	\$42 00
Number of trees sprayed, 69.	
Cost of wash per tree .....	43
Cost of labor for making wash per tree .....	03
Cost of labor per tree .....	14
Total cost of treatment per tree .....	60

COST OF SPRAYING APPLE ORCHARD IN 1906.

*Boiled Lime-Sulphur Wash.*

10,000 gallons of sulphur wash:	
3,000 lbs. sulphur @ 2½c. ....	\$82 50
4,000 lbs. lime @ 45c. per cwt. ....	18 00
Fuel .....	4 00
Seven men for 9 days @ \$1.50 .....	94 50
Two teams for 9 days @ \$2.00 .....	36 00
Wear on sprayer (5 per cent. on cost) .....	22 50
Total .....	\$257 50
Number of trees sprayed, 586.	
Cost of sulphur wash per tree .....	18
Cost of labor for making wash per tree .....	02
Cost of labor per tree .....	20
Total cost of treatment per tree .....	44

The following table is a general summary of data given, showing number of gallons of each mixture used to spray one tree, and cost of treatment.

*Tabulated General Summary.*

Name of spray	Average per tree			Cost of treatment	
	No. gals.	Cost of spray	Cost of labor*	Total per tree	Average per acre.
Petroleum	5	\$ .44	\$ .09	\$ .59	\$17.70
Boiled lime-sulphur wash....	14	.15	.17	.36	10.80
Kerosene-lime wash	14	.43	.17	.60	18.00

RESULTS OF SPRAYING IN 1905 AND 1906 ON SCALE AND TREE. The applications of crude petroleum in 1905 to rows 2-10 inclusive, as shown by this chart, delayed leafing three weeks, and destroyed the fruit crops. The oil was a most efficient spray on scale, the effects lasting through 1906. The trees receiving this treatment are to-day in much better condition with respect to scale and thriftiness than in 1904. The sulphur wash caused no injuries, and was usually not quite so effective as the applications of the oils. The kerosene-lime mixture severely injured fifteen trees and gave variable results on scale. In 1906, the orchard was sprayed with the boiled lime-sulphur wash, with no apparent injuries to the trees. The general appearance of the trees in early summer was better than in 1904, which was largely due to the greater improvement of the Greenings. On August 11, the orchard seemed in better condition with respect to scale than for several

\* Includes labor in making spray.

years, as very little fruit was spotted. During September and October, the scale was unusually prolific, resulting in more or less spotting of fruit, which in this respect was marketable. The crop of Greenings, rows, 3-6, with exception of two trees, was quite clean. The Spitzenburgs and Baldwins, rows 7-12, were very clean. The worst infested part of the orchard was along the ditch running through rows 14-17, and the northern part of rows 21-25. The scale was well controlled in the eastern half of the orchard, but was more abundant in the western half. The fruit yields in 1904 were 9,000 bushels; in 1905, 2,100 bushels; and in 1906, 3,000 bushels. The fruit this year was much injured by the codling moth, the control of which was not a part of the experiment.

### SUMMARY OF RESULTS.

Sulphur washes are cheap, safe and reliable sprays for the treatment of peaches, plums, pears and apple trees of modern size, and are specially recommended for the treatment of peaches for joint control of scale and leaf curl. Applications must be thorough. Good nozzles and a pump with high pressure to produce a fine spray are essential. Cost of spraying per tree is variable, depending on management, weather conditions, labor, kind and cost of fuel and spraying supplies, and degree of thoroughness of spraying. In spraying trees from five to eight years of age, the cost of treatment will vary from 5c to 13c per tree in commercial orchards. Apples from thirty to fifty years of age will cost from 20c to 50c per tree to obtain reliable results on scale.

Treatment of old apple orchards has not been usually successful, largely due to the lack of thoroughness in spraying. Best results on scale have been obtained by orchardists by careful pruning of trees and by spraying with sulphur washes and crude petroleum on alternate years. By this system of treatment orchardists that were fearful of losing their orchards have this year marketed comparatively clean crops. Average cost of sulphur wash per tree 36c, crude petroleum 59c. Crude petroleum is the most efficient spray on scale but may injure trees. It is believed that for results of work that applications of sulphur wash or crude oil emulsion, twenty-five per cent. oil, would prove equally effective on scale without risks of applicable injuries to trees. Commercial insecticides, in all but two of experimental orchards were much less effective than the sulphur wash.

### CRUDE PETROLEUM.

For spraying purposes a grade testing about forty-three degrees Beaume should be used. This is a most efficient spray on scale, but dangerous if used in excess on trees. *Apply clear petroleum on old apples only on a sunny day as buds swell and stop spraying when oil commences to run on bark. Only nozzles with fine apertures should be used. Resort to oil treatment for apples is only advised after failure to control scale by sulphur wash.*

### HOME-MADE OIL EMULSIONS.

*Kerosene Emulsion.*—Dissolve one-half pound of soap in one gallon of boiling water. Remove vessel from near the fire and add two gallons of kerosene. Emulsify the whole by pumping it continuously through a small force pump until a creamy mass is formed, from which the oil does not separate. This is the stock material. For mixture containing ten per cent.



oil, dilute whole of stock material with seventeen gallons of water, and for a mixture containing twenty-five per cent. oil, dilute stock material with five gallons of water.

Then ten per cent. oil mixture may be used as a summer spray to check breeding of the scale. If this strength can be used safely on the foliage, increase the percentage of oil gradually in remaining preparations until a twenty-five per cent. oil mixture is reached, if no injuries to foliage in the meantime follow. A twenty-five per cent. oil emulsion will kill both young and old scales, and may be safely used for the treatment of trees in early spring as buds are swelling.

*Crude Petroleum Emulsion.*—Dissolve one-half pound of soap in one gallon of boiling water, and stir in one-quarter pint of liquid crude carbolic acid (100 per cent. straw color). Remove vessel from near the fire and add two gallons of crude petroleum. This should be emulsified after the manner of making kerosene emulsion.

For a mixture containing twenty-five per cent. crude petroleum, add five gallons of water to the stock material. This is advised for the treatment of trees in the spring as buds are swelling.

#### PROPRIETARY OIL EMULSIONS.

A number of these proprietary emulsions, known as Scalecide, Kil-O-Scale, etc., are now on the market. These are handy preparations for treatment of a few trees and when conveniences for preparing home-made remedies are wanting. To obtain satisfactory results, two applications should be made, using from seven per cent. to ten per cent. of the stock emulsion.

#### SULPHUR WASHES.

*The boiled lime-sulphur wash:—*

Lump lime .....	20 lbs.
Sulphur .....	15 lbs.
Water .....	50 gal.

Slake the lime with hot water and make a thin whitewash. Stir in the sulphur and boil mixture one hour. Dilute mixture with water to make required amount of wash. Flowers of sulphur, and light and heavy sulphur flour may be used. *This is the best spray for the average orchardist and is especially recommended for the treatment of peaches. Should be applied to dormant trees in spring.*

*The self-boiled lime-sulphur wash.*

Lump lime .....	30 lbs.
Sulphur .....	15 lbs.
Caustic soda .....	4 to 6 lbs.
Water .....	50 gal.

Place lime in receptacle and start it to slake with water, hot preferable, using enough to make a rather thin paste. As soon as boiling action commences, add the sulphur, which has just previously been made into a paste with water. After the slaking of the lime, add the full amount of caustic soda and stir till the soda is dissolved. Dilute the mixture with water to make the required amount of wash. The soda used in this wash is a powdered seventy-four per cent. caustic soda, made in Philadelphia, Pa. This mixture is advised when conveniences are wanting for the preparation of the boiled sulphur wash.

*The self-boiled salsoda wash.—*

Lump lime .....	20 lbs.
Sulphur .....	15 lbs.
Salsoda .....	10 lbs.
Water .....	50 gal.

“Put five or six pailfuls of hot water in a wooden barrel, preferably a thick pork or oil barrel, add the lime, quickly following that with the sulphur and the salsoda, and stir till the slaking is practically completed. It may be necessary to add cold water at intervals to keep the mixture from boiling over. When boiling ceases, cover barrel with burlap and allow it to stand fifteen to thirty minutes or more. This mixture is advised when the conveniences are wanting for the preparation of the boiled sulphur wash.”  
(Dr. E. P. Felt.)

## COST OF SPRAYING MIXTURES.

With copper sulphate at \$7.00 per cwt., Paris Green at 25c. per lb., arsenate of lead at 14c per lb., lime at \$1.10 per barrel, sulphur at \$2.50 per cwt., caustic soda at 5c per lb., salsoda at 2c per lb., kerosene at 12c per gal., limoid at \$2.50 per barrel, Scalecide at 50c per gal., crude petroleum at 11c per gal., whale-oil soap at 4c per lb., and crude carbolic acid at 39c per gal., the cost of raw materials for making one barrel, fifty gallons, of the several mixtures is as follows:

1. Bordeaux mixture .....	\$ 38
2. Bordeaux mixture with $\frac{1}{4}$ lb. Paris green.....	14
3. Bordeaux mixture with 3 lbs. arsenate of lead .....	80
4. Lime-sulphur wash .....	50
5. Lime-sulphur-salsoda wash .....	70
6. Lime-sulphur-caustic soda wash .....	81
7. Kerosene-Limoid wash (10 per cent. oil) .....	82
8. Kerosene-Limoid wash (15 per cent. oil) .....	1 23
9. Kerosene-Limoid wash (20 per cent. oil) .....	1 64
10. Scalecide (5 per cent.) .....	1 25
11. Scalecide (8 per cent.) .....	2 00
12. Scalecide (10 per cent.) .....	2 50
13. Crude petroleum .....	5 50
14. Kerosene emulsion (10 per cent oil) .....	65
15. Kerosene emulsion (25 per cent oil) .....	1 56
16. Crude petroleum emulsion (10 per cent. oil) .....	67
17. Crude petroleum emulsion (25 per cent. oil) .....	1 67

## REPORT OF COMMITTEE ON RESOLUTIONS.

We desire to place on record an expression of our warm approval of the action of the Dominion Government, in having, in response to the request of this and other organizations, procured the passing of legislation placing the control of express rates in the hands of the Railway Commission.

We hope the action of Parliament in giving a legal definition to No. 2 grade of apples will have the effect of giving to the produce of Canadian orchards a still better standing in the markets of the world.

We desire to express our thanks to the Hon. Sydney Fisher for his action in calling a Dominion conference of fruit-growers last March, a conference



which resulted in harmonizing many little antagonisms between the Provinces, in bringing fruit-growers from all parts of the Dominion together for united action, and in giving a still further impetus to what has become a great national industry.

We believe the thanks of every commercial fruit-grower in Ontario are due to Alexander McNeill, chief of the Ottawa Fruit Division, for the remarkably full and correct reports issued by him during the late growing season in regard to fruit conditions and prospects—reports which placed growers in a measure on a footing of equality with buyers in regard to factors governing market conditions.

We would, however, strongly recommend that fuller information than we have now be given in regard to crop conditions and market prospects in other countries, and that to this end the Department of Agriculture at Ottawa be asked to secure the co-operation of the Department of Trade and Commerce in securing reports from Canadian commercial agents in Great Britain, Australia, and South Africa, in regard to probable production before crop maturity; also that the co-operation of horticultural associations in the United States be secured, and an exchange of timely information with these be arranged for.

We regret that, aside from the action taken at Ottawa, resulting in placing of express rates under the control of the Railway Commission, comparatively little has been done in regard to transportation during the present year. We most strongly urge that action be taken by the Transportation Committee during the coming year, looking to a material reduction in freight rates on apples, and a sweeping cutting down in express rates on all lines of fruit.

That this association would urge the Minister of Inland Revenue for the Dominion to amend the Act respecting staple commodities (that *re* fruit baskets) in accordance with the resolution passed by the fruit associations, and that the Government make, and stamp the forms and issue them to the basket manufacturers to ensure uniformity of fruit packages.

That inasmuch as a large number of fruit-growers are using carbonic acid gas as a source of power in their spraying operations, and as a great deal of difficulty has been experienced in securing a satisfactory supply in Canada, we would respectfully urge upon the Dominion Government the desirability of instituting some system of registration of the containers, so that these containers might pass freely to and from the United States, duty being levied upon the gas only. By this means a satisfactory supply might be available, and spraying operations greatly facilitated.

We strongly urge that the Department of Agriculture for Ontario, in addition to what is now being done and in addition also to what has been asked in the resolution adopted on the motion of Mr. Peart, arrange for obtaining special reports, after fruit has set, from the most reliable growers from the sections in which fruit is largely grown.

We strongly approve of the main point in the Robertson resolution, namely, that legislation be asked which will provide that nurserymen shall guarantee their stock as true to name, and that where the promise is not fulfilled, a reasonable and just penalty be imposed.

We are delighted to note the extension of the co-operative movement among fruit-growers in the Province; regret that comparatively little has been done this year in the extension of this movement by this association, and strongly urge that an officer be appointed whose duty it shall be to give his whole time to the encouragement of organizations now formed, and to creating of new ones.

That we desire to show our unbounded gratification at the splendid public spirit shown by Mr. Rittenhouse of Chicago, in giving a farm for experimental work in tender fruits, and in the prompt action of the Ontario Department of Agriculture in providing for the equipment of the same.

That a deputation visit the Minister of Agriculture for Ontario before this convention adjourns to press for the Ontario legislation asked for in this and the Peart resolution. Also that copies of resolutions relating to Dominion matters be forwarded by mail at once to Hon. Sydney Fisher.

We desire to place on record our warm appreciation of the invaluable services rendered by the directors of this association, many of whom have served long terms in office, frequently at serious inconvenience to themselves. We recognize also the splendid spirit shown by these same directors, now that a new stage of development is called for, in so frankly joining in the movement to make the organization more representative than it is at the present time.

That the thanks of the Association be extended to Mr. Hale of Michigan and Prof. Parrott of New York for their valuable addresses and their attendance at the meetings.

On motion, the report of the Committee on Resolutions was adopted.

On motion of Mr. Harold Jones, seconded by Mr. G. C. Caston, the following gentlemen were nominated by the chair to wait upon the Provincial Minister of Agriculture forthwith and place before him the resolution adopted by the convention in reference to the gathering of statistics by the Province respecting the fruit industry: W. H. Bunting, Murray Pettit, Wm. Orr, Harold Jones, Elmer Lick, H. H. Groff.

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## THE FUTURE OF THE APPLE IN ONTARIO.

BY A. MCNEILL, CHIEF OF FRUIT DIVISION, OTTAWA.

If the subject of my address had been chosen by myself, it might have been suspected that I laid some claim to the prophetic faculty. Such is not the case, however, and whatever conclusions I shall draw are based upon facts, a few of which I shall present to you this afternoon; you will be just as capable as I of judging whether the conclusions arrived at are correct or not. My object in bringing these facts before you is largely for the purpose of having them criticized, as I am not sure that the conclusions I am drawing are final; or at any rate, I am not so sure but that I shall welcome any criticisms you may make respecting them.

Apple growing is the largest fruit interest we have, and the future promises a still greater expansion for this industry. The apple and its products account for nearly five million dollars of the exports from Canada and, with mixed farming, the domestic trade certainly amounts to five if not ten times that amount. The extraordinary development of the apple growing industry in some parts of Ontario in the last few years on the one hand and, on the other, the complaints we hear respecting it from some sections, some of which were voiced by the Provincial Minister of Agriculture in his address, indicate that there is an extraordinary condition of affairs surrounding the industry. It is part of my purpose to endeavor to explain some of these seeming anomalies. I have no hesitation in confessing that in dealing with the subject I have kept the industrial end—the money-making end—constantly in view, and that I am not referring to the growing of apple trees



simply for the pleasure of growing them, nor for the purpose of providing a supply of fruit for home consumption. My thought is simply to investigate with the object of putting the apple growing industry on such a basis that the producer may get the most out of his efforts in orcharding.

The map before you will illustrate my subject. This map shows four districts in Ontario in which the apple is an important product. Parts of the Province are not suitable for commercial apple growing, but the remainder of the Province I have divided into four districts where the industry is of importance and where it may be followed with very great profit. To understand the differences that exist between these districts, it is necessary to consider somewhat their physical features and climatology, as these determine to a large extent the development of the industry. You will bear in mind that there is no distinct line of demarkation between these districts—the one shades imperceptibly into the adjoining one.

The District marked No. 1 comprises the Lake Erie group of counties, including the western end of Lake Ontario. Here there are about two million apple trees of bearing age. It is the Canadian peach belt, where the peach, plum, quince, sweet and sour cherry and the smaller fruits are, generally speaking, perfectly hardy. There is a marked difference between the temperature of this district and that of District No. 3. By May 8th the Ben Davis apple will be in blossom at Windsor, but it would not be in blossom at Lindsay until at least two weeks later. At Windsor no frost would be expected that would kill the leaves of the grape previous to October 10th or 15th, but in District No. 3, or in the greater portion of it, September 15th will often bring a frost sufficiently severe to touch tender vegetables. While there may be just as high temperatures in District No. 3 as in No. 1, the periods of heat are of shorter duration. The result of these conditions is that the apple starts growing two weeks earlier in District No. 1 than in District No. 3, or in the greater part of District No. 2. Then during the summer months it is subjected to a higher average temperature, which condition continues well on into October. The effect of this is that winter apples in this section are mature perhaps a month before they are mature in Districts No. 2 and No. 3, the practical effect of which is to put District No. 1 out of business, when ordinary conditions prevail, so far as the winter apple trade is concerned.

To-day the people of this district are wondering why the apple trade is not prospering with them. Notwithstanding the apparent scarcity of apples this year, there are thousands of bushels wasting in this section. Although the explanation is an easy one, there are a good many people who do not see it. The apple buyers' explanation is that the winter apples growing in this section do not keep. This is not really the case. The fact is that the buyers have discovered a source of supply the apples of which may be held on the trees three to five weeks later in the season, which makes the fruit more profitable to handle from the exporters' point of view. It is not that the apples of this district will not keep, but that they mature three or four weeks too early for the best export trade. For this reason the buyers have abandoned the district so far as winter apples are concerned, and while a certain class still do business there, they purchase only such apples as they can see an immediate market for. The district is obliged to market its apples under ordinary conditions by the end of November, or at least before Christmas, and if the market is not good at that time, the buyers are apt to throw up their bargains, and are in any event very cautious about making them.

This is not the case in portions of Districts Nos. 2 and 3, because there the apple operators can buy with confidence, for the reason that they know



#### EXPLANATORY NOTES ON MAP.

District No. 1 grows all the tender fruits, such as peaches, apricots, dwarf pears of all varieties, tender and all varieties of apples, plums, pears, cherries, etc. This region is specially adapted to early fruits and vegetables, being from ten days to two weeks ahead of the districts surrounding the large markets.

District No. 2 grows excellent winter apples of all varieties to perfection. It is characterized by a large number of comparatively small orchards containing numerous varieties of fruit. Many portions are excellently adapted for plum and pear culture.

District No. 3 is specially adapted for winter apples. There are many large orchards especially on the shore of Lake Ontario. The farmers here are making a specialty of orcharding. District 3(a) on the Nottawasaga Bay should be classed with District 3, having large orchards of comparatively few varieties of winter fruit.

In District No. 4 the ordinary winter varieties are not hardy. This District, however, grows Fameuse, McIntosh Red, Wealthy and Wolf River to perfection. The first two are dessert apples that if properly packed should command the very highest prices as dessert apples. District 4(a), the midland counties of Western Ontario, on account of their altitude, must be classed with District 4. In this district the ordinary winter varieties grown in the adjacent counties are not hardy.



they have an apple which they can store if the market is not good, and if they have to hold them even for a considerable time, the loss is a small one. This explains why the industry has not prospered of late years in District No. 1. It is not the apple that is to blame. It was in this district that the first apple orchards were planted, and where the apple reputation of the Province was made, and there is no finer fruit shown at our Exhibition than that which comes from this section; it is highly colored and of splendid flavor and of good size. The finest Baldwins, Spys and Kings I ever saw were grown in this district, but they have one defect that offsets all their virtues as winter export apples: they are not good keepers. The farmers here planted winter varieties more numerous than medium and early varieties, for the reason that even in the early history of orcharding in this Province, there was a surplus of early fruit; consequently, they now find themselves with orchards that are not as profitable as they should be. There is, however, still a possibility of making these orchards valuable assets. Had organization been effected and had intelligence been put into the business, there need not have been a single apple wasted. The remedy lies first in organization into co-operative associations by means of which these apples might be sold during the months of September, October and November. I believe that there is a market for every apple grown there that could be sold before Christmas. There are two markets to which I would draw special attention. First, that of the North-West; I cannot be too enthusiastic about the North-West market for apples. I am prepared to risk my reputation on the statement that this market is opening up faster than we are prepared to supply it. In the past the population has been thinly scattered over a wide extent of territory, and there was not enough at any one point to enable growers to reach them in carload lots. The cost of distributing and other expenses made the fruit so high in price that consumption was nearly nothing. Now, there are hundreds of little stations on the different lines throughout the Western Provinces, each getting a population large enough to take fruit in carload lots. Large warehouses are being established at many points, and they are now taking a carload per week for distribution in many places. At Regina there are two large distributing warehouses, two more have been built at Calgary, and at Lethbridge one of the best in Canada is being opened. It is a splendid concrete building with cold storage and all modern appliances. At Moosejaw, Edmonton, Saskatoon, and other points we shall see a similar development in the next few years, and the person who is in a position to put early apples on the markets of the West is bound to make money.

The early apple market of Great Britain is one that has always been neglected. It has been supposed that we could not sell early apples there if the apple crop in Great Britain was a good one; but, with our present system of cold storage transportation, we can put early apples on that market and can compete with the English grower to advantage, so that we are practically on even terms with him. We have three advantages: first, a better quality of fruit, not better than the best English fruit, which is no doubt ahead of our best, but better than the average run of the commercial orchards of Great Britain; second, it is packed uniformly and honestly; and third, there are large lines of it, which gives it one of the greatest advantages of all over the small lots of English grown fruit. The large English distributing firms would rather handle Canadian apples than the home grown product, because the latter comes in small lots, variously packed and of many varieties. We have the influence of these large brok-

erage firms on our side, and, if we do our share as fruit growers, we shall have our share in the early apple trade of Great Britain.

In evidence given before the Departmental Committee appointed by the Board of Agriculture and Fisheries to enquire into the Fruit Industry of Great Britain, Mr. W. Chambers, a fruit grower in Kent, Eng., said:

"The fruit that is sold there is of a better color than we can under any circumstances produce; for instance, the apples that are brought from America and Canada. We cannot grow such beautifully colored and handsome fruit; I do not think that by any cultivation or management we can come up to the sample that is sent us from abroad."

Mr. Wm. Craze, a fruit grower in Cornwall, Eng., said:

"It appears to me that the success of the Canadian and American apple trade is mainly on two lines, leaving the grading out. First, the barrel is of the same weight practically, whoever it is packed by, and is non-returnable. The second great advantage is that a barrel of Baldwins, Spies or Greenings can be repeated next day, and right through the autumn and winter, whereas in our English apples you get a consignment of forty or fifty bushels to-day, and you say to two or three good buyers, "These are the sort of thing that will suit you," and you may see no more of the same kind that season. The point to put before the growers is that they have too many sorts. There are four or five principal sorts in Canada and America. Three million barrels of apples came to Great Britain this year, principally of five varieties."

Mr. J. W. Dennis, fruit merchant in London, said:

"From a market point of view a great many varieties are bad. The result of it is that as soon as the American and Canadian apples come upon the market the best retailers, who ought to be the best customers for the British fruits, leave them severely alone because they cannot get a continuous supply. The customer finds that a certain apple goes, and he comes back the next day or week and wants the same, and immediately the American and Canadian barrels come in, the shopkeeper will buy them; that is why he leaves the British fruit and takes the Canadian or American fruit."

Mr. Thos. Russell, fruit merchant of Glasgow, in reply to the question, "And you find that the Canadian packing is very good?" said:

"Canadian packing is A1. We cannot get better packing anywhere now. We have a few brands that, on account of the packing, will bring shillings a barrel more than other apples. The Canadian fruit growers are fined if their fruit is found put up not in accordance with the standard. The Canadian Government has inspectors at all the ports and large centres."

I would not speak so confidently of this trade had it not been going on successfully for the last three or four years, during which time some early apples have been shipped every year. This year there was a good crop in Great Britain, and Canadians were afraid to ship early apples there, but the fact remains that prices for early apples were exceedingly satisfactory, and that the market could have absorbed three times as many as were sent.

Here I may say that there is some misapprehension on the part of our growers as to the transportation facilities that have been provided for this early trade. They fail to appreciate the fact that we now have the best system of transportation on the continent of America, if not in the world. At the present time the safest period in the life of the apple is the time it spends in travelling between Montreal and Liverpool or Glasgow. The conditions on board ship are so uniform and the checks so perfect that I see no reason why there should be a breakdown in it. Its reputation is



now well established, and I have no hesitation in claiming that this link in the chain of transportation is now practically perfect.

The refrigerator car service is only fairly well managed. The weakest link, however, in the system is the one from the picking of the apple to the placing of it in the refrigerator car. When the people of District No. 1 learn the value of cooling their fruit before it is put in the package as soon as it is off the tree, and then keeping it cool, there will not be the slightest difficulty in putting our tender fruits on the markets of Great Britain.

With regard to District No. 1, I would advise that in new plantings early varieties, such as the Astrachan, Duchess and, perhaps, the Wealthy, preponderate, as they can catch the high prices at least two weeks ahead of the rest of Canada. If the present orchards of this district, with the late varieties, are vigorous, by all means retain and care for them, utilizing the fruit by selling it immediately on the English market or to the North-West or by doing as they have done in New York State in establishing a system of cold storage in which these winter apples could be placed as soon as they are properly matured. Then they would be on equal terms with the growers of other districts, except that the cold storage would add to the cost of production 25 to 40c. per barrel.

I may suggest here, too, that proper cultural methods will help wonderfully to improve the keeping qualities of the fruit. What is required is to prevent the maturing of the fruit; keep it growing as long as possible. This can be done by making the orchard soil very rich and keeping up clean culture late in the season. Where this was done in cold season with plenty of moisture, such as 1903 and 1904, winter apples stored with little or no loss.

District No. 2 includes the second tier of counties north of Lake Erie, and may be considered in conjunction with District No. 3, which comprises the southern ends of the Lake Ontario counties, that is to say, from the shores of Lake Ontario northward to about as far as the line of the Canadian Pacific Railway, or a little further north in some sections. So far as the climate is concerned, these two groups are very similar. They are the districts in which the winter apple grows to perfection and keeps the longest.

District No. 2 has a peculiar history, as it is a region of small orchards with many varieties, two factors which have a very important bearing on the apple growing industry in the section. In the aggregate there is a large number of bearing trees, but they are scattered over every farm in lots of from two to five acres, each orchard having from ten to fifteen varieties. Along the shores of Lake Huron there are a very few large orchards, but they are rare. This makes it difficult and expensive for the apple operator, and consequently he does not pay a high price for these apples. The reputable and large apple buyers do not find this a congenial field of operation. They have to deal in such small lots and with so many people that the mere burden of buying becomes intolerably irksome as well as expensive. In too many cases the legitimate apple merchant is replaced by the irregular buyer who has neither money nor proper selling connections, but who offers an absurdly low price in the hope that he can turn over his holdings to a regular dealer at a big profit. If he fails in this he repudiates his bargain with the grower, who has no recourse.

The remedy, of course, is to pack and sell co-operatively. Indeed, this is now being done with splendid results. When these have had their time to show their full effects, I confidently expect that there will be no feature of the system of mixed farming that is followed here that will yield such good returns as the orchard.

On the other hand, District No. 3 is a region of large orchards of few varieties where dealers can get large quantities of one or two varieties with comparative ease. Orchards of twenty and twenty-five acres in extent are numerous, while ten acre orchards are quite common. Extending back from the lake front in what is known geologically as the basin of the old Lake Iroquois, is a country that is particularly well adapted to the growing of winter apples. You hear no complaints in this district about apples not paying. Many men here with ten acres of orchard have sold their apples in a lean year for as much as the rest of the products in the one-hundred acre farm were worth. Last year as much as from two to three thousand dollars was paid for the product of some comparatively small orchards. With this district I have included a small section of country adjoining Nottawasaga Bay, an extension of Georgian Bay (3a on the map). This territory consists of the north-eastern slope of the Niagara escarpment, which at this point again becomes steep and bold. On the slope of the "Mountain" are found some of the finest orchards in the country, and the section is as favorable a spot for growing winter apples as exists anywhere. I know of no place where apples can be grown to better advantage. Some very large orchards have been planted here which are paying the owners well.

District No. 4 comprises the western midland group of counties, including Perth, Wellington, parts of Grey, Waterloo, etc. (4a on the map), and also the Ottawa and St. Lawrence valleys, and the country lying north of District No. 3. The western midland counties may be regarded as the Highlands of Western Ontario, although it is a fact that is not generally recognized as the increase in elevation as you proceed inward from Georgian Bay is very gradual. Nevertheless, it is a fact that at Durham you are 1,100 feet higher than at Goderich. In British Columbia an abrupt elevation of 1,100 feet would give you almost a mountain range, and although it is not so noticeable in Ontario, it makes just as much difference in regard to climate as it does in British Columbia, a difference which has a remarkable effect upon the growing of apples. This district is in reality the watershed of this portion of the Province, and so far as apple growing is concerned, we have to classify it with sections of the Province that are considerably farther north. The tender class of winter apples are not hardy at all points in this region, and are, therefore, not a safe proposition for the orchardists, and my advice to growers would be not to attempt to produce those varieties on a large scale.

So far as the northern portion of the Lake Ontario counties and the St. Lawrence and Ottawa valleys (District No. 4 on the map) are concerned, I cannot recommend the growing of winter varieties. At the same time, there is as great a future here in apple growing as in any of the other districts mentioned. Here is the home of the Fameuse type, including the McIntosh, Wealthy, Scarlet Pippin, etc. The people in this district have the opportunity of developing an enormous dessert trade in these varieties, and these are the ones to which they should devote their attention. There is a large market for these varieties as dessert apples. Boston, New York, Chicago and other large cities will take every apple they can grow. Nevertheless, growers in the district complain that they get only 50c. to \$1.00 a barrel for their fruit. My reply is that as they put it up, it is not worth more. To pack these varieties in barrels is simply to spoil their value as a dessert apple, and unless the growers here will produce a dessert apple and pack it properly in boxes, they will never make the greatest success of the business. If, on the other hand, they will learn wisdom, I do not see any reason why there should not be as great and as successful a business in apple growing here as



in any other part of the country. I am not sure, however, that people always do what is in their own best interest under given circumstances.

May I be permitted, then, to sum up generally the situation in the four districts? It is not at all likely that in the Lake Erie counties (District No. 1) there will be any large plantings of winter fruit. In the peach growing districts the land is too valuable and the profits much larger from the tender fruits, peaches, plums, grapes, etc. It would be unfortunate, however, if the orchards which are now in full bearing, well kept and vigorous, should be allowed to deteriorate. The fruit from these orchards can be utilized, as has been pointed out, either by shipping as soon as the fruit is ripe to the North-West or to the English markets; or, what would be more preferable, by establishing a series of cold storage stations where the fruit could be held if necessary as winter shipping stock. This system of cold storage warehouses is particularly commendable because the cold storage facilities are required for the proper shipping of the tender fruits. It will also be required if this district will take up its legitimate business in apples of growing extra early fruit. There appears to be no reason in the world why this southern tier of counties should not supply for the first two or three weeks an enormous quantity of apples that will be in demand before the other sections have ripe fruit. For the proper shipping of this early stock, it will be necessary to have cold storage stations. Therefore, while I would recommend that for new plantings the fruit growers of this district confine themselves very largely to the early varieties, I would at the same time strongly urge a system of cold storage stations that could be utilized not only for the proper shipping of this early stock, but in preserving the product of the present orchards for winter shipping if necessary.

The recommendation for apple growers in District No. 2 would be to confine themselves quite largely for the present to the winter varieties. There seems to be no reason why in certain portions, especially along the shores of Lake Huron, large orchards should not be planted of these varieties; but, presuming that the present system of small orchards with mixed farming is maintained, the salvation of the industry depends upon the formation of co-operative associations. Co-operative associations, of course, would be of very great advantage for every part of Ontario, but for this particular district with those small orchards of many varieties, co-operation is an absolute necessity to success.

For District No. 3 the recommendation would be to continue to plant the large orchards, making a specialty of winter fruit and of orcharding. Speaking generally, farmers here can more easily take up orcharding as a specialty than in other sections. The winter varieties can be recommended here with perfect confidence inasmuch as this district possesses an advantage over every other part of apple-growing North America, and in no contingency that can be imagined can fruit of this class be grown cheaper and better than in District No. 3. The growers in the southern part of the Province as well as in the States south of us, are all at the disadvantage of having to use cold storage which, in addition to adding from 25 to 40c. a barrel to the cost of production, is liable to produce certain losses which are not at all to be feared north of Lake Ontario.

District No. 4 can make orcharding a success on a large scale only by catering to the fancy dessert trade. This the growers of that district can do with the McIntosh and the Fameuse so as to produce a revenue equal to if not greater than anything that can be produced in other portions of the Province. The flavor and keeping qualities of these two apples are such, grown in this section, that they can be boxed and shipped so as to present

an unrivalled appearance when they are placed upon the markets either of the Old Country or of the large cities in our own country or in the United States. A fortune awaits the man who will take up the growing and packing of the Fameuse and McIntosh as a fancy dessert apple.

Speaking of the Province as a whole, one cannot but be impressed with its extraordinary capacity for producing this king of fruits. It possesses within itself almost all the requisites, and it is safe to say that it will take the first place in the markets of the world, as well as in our extensive markets in the North-West, in the production of the best of fruit.

Mr. RICKARD, Newcastle: I am very much pleased with Mr. McNeill's address. It has brought forward a number of important facts which it is well for us to remember. He has sized up conditions very nicely and in a way that shows he has a thorough knowledge of the different sections of the Province. I live in one of the best winter apple districts, and there the apple industry is on the increase. In the township of Clark we have from 200 to 300 acres of winter apples within a square mile; and the apple growing industry is there the most important one from the financial point of view, as it means hundreds of thousands of dollars in that section. This money comes largely from across the ocean, as most of our apples go that way, and are likely to continue to do so. We have no fall apples in that section, as they have not been planted, and it may be that some of the winter varieties grown in District No. 1, which come in three weeks earlier than our own, might find a place on our local markets.

## MARKETS OF THE NORTH-WEST—TENDER FRUITS.

By ROBERT THOMPSON, ST. CATHARINES.

You are doubtless aware that three years ago the government authorized Prof. Reynolds of the Ontario Agricultural College to make an experimental shipment of two cars of fruit to Winnipeg, one from Grimsby and another from St. Catharines. Previous to that time a few spasmodic shipments of from two to five cars in the season had been made. I do not think there was more than that from one town, if we do not include grapes and apples. These shipments were somewhat unsatisfactory on the whole, being sometimes good and sometimes bad. If the market happened to be good at Winnipeg, we got no more than factory prices, and if the market was glutted we had to pay the freight, which happened on more than one occasion. The report of the Government shipments has already been published. Since then the growers in the St. Catharines district have felt that this was a market that should be taken advantage of. We had our co-operative association and our cold storage building, and we decided to try to utilize that market. Therefore the year following the Government shipments, the association sent out in the neighborhood of twenty cars, but the growers who contributed did so at their own risk. If you had asked the opinion of the majority of the growers who took part in these shipments, they would no doubt have stated that they were a failure, but to those who contributed to all or nearly all of the shipments the results were sufficiently satisfactory to induce them to again go into the business this spring. In this year's shipments there has been a great improvement in this respect. It is very gratifying in looking over the names of the shippers to find that from twenty-five to thirty appear in connection with the majority of shipments instead



of only four or five in the year previous, and all the more so when we consider that this year about fifty carloads were forwarded. I think these men will admit that they have been well satisfied with the results.

Coming to the lessons learned, I want first to impress upon you the necessity for co-operation if you intend to take advantage of that market. It is useless for two or three individuals to think that they can send forward a car occasionally and obtain really satisfactory results. The shipments must be continued regularly throughout the season. In making this statement I, of course, refer to mixed fruits. The next point is that in order to receive the best returns from that market, you will have to put your fruit up in the way they want it, and always see that it is shipped in good condition. This necessitates care being taken that it is gathered at the right stage of ripeness and that it is properly cooled before being placed in the cars. In this connection the records of the thermographs in the cars have been very interesting. These the Department at Ottawa placed at our disposal. In cases where the fruit had been cooled to 40 or 45 degrees before being placed in the refrigerator car, the thermograph showed that the temperature dropped within about twenty-four hours to that same temperature, and did not rise above it during the rest of the journey. If, however, only one quarter of the fruit had been cooled previously, it sometimes took sixty hours for the temperature of the car to get down to 40 or 45 degrees, if it got there at all.

Another advantage of co-operation is that you can divide your car between various kinds of fruit, not overloading with any one kind, which was one of the causes of failure in the earlier shipments. One car would carry too many tomatoes, another too many pears, another too many apples for the market to absorb at one time, and low prices resulted. Another advantage is that, where a number are contributing, you are able to load your cars very quickly and to name certain days in each week on which fruit will be received. The growers can then bring in their consignments of fruit on these days, and you are sure of having enough to fill the car. The next advantage is that by co-operating and making regular shipments you can deal with the railway companies on a much more satisfactory basis. If you are prepared to ship 50 or 60 cars, the railway companies will vie with each other in giving you a good service. Another advantage is that an association can get better information as to the market demands than can the individual grower. Nearly all of the larger associations have their own icing station, and are thus enabled to ice their cars twenty-four hours before the fruit is put on board. When it is ready to leave, the car is re-iced.

During the past season a few of us sent consignments of strawberries to the North-West with partial success. The early shipments went through well and commanded good prices. The berries compared favorably with those from British Columbia and Missouri, but were not quite so good as those from the Ozarks or those grown in the neighborhood of Vancouver. The variety called the MacGowan went through in the best shape, but the Williams was the variety chiefly sent, and netted as much as from \$2.00 to \$3.50 per crate. A few cherries were sent, and they went through in good condition and realized fair prices. In shipping tomatoes we had learned a lesson from the previous years. We found that we had been sending our tomatoes too green, and that they did not want green tomatoes and prices were low. We found that if they could be picked at exactly the right stage, they would arrive in good condition and sell at good prices, but that if sent too ripe or too green, they would not bring within 25 per cent. as much. This year our shipments were very satisfactory and brought us better returns than our peaches. Most of our tomatoes were packed in boxes, but at the

same time it would be a mistake to make a full consignment of fancy grades, as the market requires and is able to take a certain proportion of a second grade article.

In regard to peaches, the weather during the season was unusually dry and hot, and the fruit spoiled much less quickly on this account. As a consequence our peaches shipped better than in years past, and their quality was not altogether owing to packing, etc. The majority of our peaches were packed in boxes, and the price received was better than we obtained at home. They carried almost invariably in good condition. We placed some in every car, starting with Triumph, Early Rivers and following up with Smock, etc.

Q.—What was the size of the box?

A.—They were 20 pound boxes and the fruit was in two layers. There is a good market in the North-West for our pears in part carloads. The report we received from different points was that our pears compared favorably with those from British Columbia, that although they were not quite so large, they were of better flavor and kept somewhat better. British Columbia is not shipping out pears to any extent, owing to the pear blight.

Q.—What variety did you send?

A.—We started with Wilder and finished with Keiffer. I believe that the future of our early apple trade is with the North-West. If they are properly handled, they will realize good prices. In regard to the competition of British Columbia in the North-West market, I came back from my western trip last spring feeling that I was fully justified in advising my neighbors to stay right in Ontario, and that there is a better future before the fruit business in Ontario during the next twenty years than there has been during the past twenty. I do not think we need fear the competition of British Columbia for twenty years to come, and not then in some lines. They can never grow grapes to compete with us commercially, as their nights are too cold. With regard to temperatures, I saw four degrees of frost when plums, pears and peaches were in blossom, and they will admit that they sometimes get it as low as twenty-six below zero during the winter months.

I found that there was a prejudice against some of our fruits at some points in the North-West, but I did not find a dealer from Calgary to Winnipeg who would not admit that he preferred Ontario apples because of their flavor and keeping qualities, provided he could depend on packing. Another thing I found was that they did not want our tomatoes, complaining that they were wormy, etc. I therefore made a shipment early in the season, and asked them to send me back word as to how they compared with western tomatoes. I got a reply by mail that they were the best they ever had had, and to send two shipments a week. In the first car sent to Calgary we placed a certain number of packages of tomatoes, and the moment the car arrived a telegram was sent to us to place 200 boxes in the next car. They had never received tomatoes like those, and my conclusion is that the west cannot compete with us so far as tomatoes are concerned. The only line there is any competition in is in apples, but they have disadvantages in connection with labor, weather, etc., while their country is divided into small isolated valleys where shipment is often a very difficult matter. My conclusion, therefore, is that we are in a better position to place apples on that market than they are, and that we can sell them cheaper and will make more money.

I find that the majority of individual shippers look upon packing in boxes as a bugbear, but where there is an association and a packing house,



the cost is a comparatively small item, as it is quite possible for an experienced hand to pack one hundred boxes per day. You can wrap and box pears and peaches at a cost of from five cents to eight cents a box, provided the work is done on a co-operative basis.

## REPORT OF TRANSPORTATION COMMITTEE.

The report of the Transportation Committee was presented by the Chairman, Mr. W. H. Bunting, of St. Catharines:—

There has apparently been some criticism of the committee's work this year, but I think I am justified in saying that the lack of action on their part has been more apparent than real. At the Dominion Fruit Conference in March last the question of transportation was pretty thoroughly discussed and a number of resolutions were endorsed by the conference bearing on this matter, but in the meantime it was felt that some better preparation should be made before taking decisive action in connection with these resolutions. The committee has therefore been gathering data on which to make out its case. Now that the express companies have been placed under the control of the Railway Commission, it is the desire of the committee to prepare a statement of the grievances which we as fruit growers have labored under in the past, in order that our case may be presented to the Commission in such a way as will carry weight and probably secure redress for these grievances. Up to the present time it has been almost impossible to secure any concession from the express companies as they are interested parties, and any representations made to them were pigeonholed, but we now have a tribunal before which any grievances may be laid. On behalf of the committee I should like to ask the members of the Association to tabulate and present to this committee any information they have which they consider would be of assistance in making out a case.

With reference to the general transportation questions by freight and steamship lines, the following resolutions were passed at the Fruit Conference:—

Resolved that the Railway Commission be requested to order:—

(a) That a time limit for the transportation of perishable fruits of not less than twelve miles per hour be put in force upon the railways of Canada, which time limit if not maintained shall place the onus of responsibility upon the carrying company if loss or damage is sustained thereby.

(b) That when the railway companies fail to furnish suitable equipment for the transportation of fruit within six days after the time an order is placed with the local agent, a penalty be provided for each subsequent day's delay.

(c) That icing stations be established at divisional points on all railways engaged in the transportation of fruit, and that cars fully iced be furnished when requested by the shipper.

(d) That at all stations where fruit is customarily loaded in car lots, shelter from sun and rain shall be provided.

(e) That when requested, shippers of perishable fruit shall be furnished by the local agent with a daily report of the location of a car of fruit while in transit.

(f) That a rate for transportation of apples be put in force that shall correspond with the present rate for flour, until such time as the railway companies furnish satisfactory equipment and service.

Resolved that the Dominion Government be memorialized to enact such legislation as will result in placing the express companies operating in this country under the control of the Railway Commission.

That we desire to recognize the value and importance of the assistance rendered by the Dominion Department of Agriculture in improving the conditions prevailing, both with reference to the home and foreign trade, and would request a continuance of these efforts as far as possible.

That copies of these resolutions be forwarded to the Dominion Government, the Railway Commission, and the various railway and express companies interested.

As I have already intimated, the resolution in reference to express companies has received the approval of the Dominion Government and these companies have now been placed under the control of the Commission. In reference to the other resolutions, the committee is still gathering data, and will endeavour to present a case before the Commission which will appeal to its judgment. From my own observations, I am inclined to think that the railway companies have already anticipated some action of this kind. The resolutions I have quoted were considered reasonable and fair to the carrying companies, and we have every hope that the Commission will order that they be put into effect.

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## PROTECTION OF FRUIT TREES FROM MICE AND RABBITS.

By W. T. MACOUN, HORTICULTURIST, C. E. F., OTTAWA, ONT.

Every year thousands of trees are injured in Canada by mice, and, in the newer districts, a large number by rabbits also. There could be nothing more discouraging to a fruit grower, or would-be fruit grower, than to see his orchard which he had cared for, perhaps, for five or six years, the trees in which were just beginning to bear, ruined by mice; and yet this frequently happens and the man loses courage, and in many cases, doubtless, does not replant. All this could be prevented if the farmer or fruit grower would use the information which has been published time and again in the newspapers and periodicals, and protect his trees from mice. Some years there is less injury than others, and this fact, like a year when there is no apple spot, leads to carelessness, and when a bad year comes the trees are unprotected.

While the depredations from mice and rabbits in winter vary from one year to another, depending on the scarcity or abundance of food, the number of mice which are in the vicinity, and the character of the winter, the injury is always greatest when the orchard is in sod, and when there is rubbish lying about; hence the latter should be removed before the winter sets in. In most cases it is not necessary or advisable to have the orchard in sod, particularly when the trees are young, although it is highly important to have a cover crop, which is also sometimes a harbor for mice. As mice may be expected in greater or less numbers every winter young trees should be regularly protected against their ravages. Mice usually begin working on the ground under the snow, and when they come to a tree they will begin to gnaw it if it is not protected. A small mound of soil from eight to twelve inches in height raised about the base of the tree will often turn them, and even snow tramped about the tree has been quite effectual, but the cheapest and surest practice is to wrap the tree with ordinary building paper, the



price of which is merely nominal. Tar paper is also effectual, but trees have been injured by using it, and it is well to guard against this when building paper will do as well. Last winter Mr. G. C. Miller, Middleton, N. S., at the meeting of the Nova Scotia Fruit Growers' Association, reported injury to 800 trees from tar paper. It would appear that some brands of tar paper are more injurious than others, as many use it without injury to the trees. After the paper is wrapped around the tree and tied, a little earth should be put about the lower end to prevent the mice from beginning to work there, as if they get a start the paper would not stand in their way. It may be stated, however, that although at least two thousand young trees are wrapped with building paper yearly at the Experimental Farm at Ottawa, there have been practically no instances where the mice have gnawed through the paper to get at the tree. The use of a wire protector, or one made of tin or galvanized iron, is economical in the end, as they are durable.

In the North, protection from sunscald is almost as important as protection from mice. At the Central Experimental Farm we have for several years been using wooden veneer protectors for the standard trees, as these protect from mice and on account of being loose about the tree leave a good air space which appears to protect the tree from those sudden changes of temperature which seem to be the main cause of sunscald. These veneers cost \$5 per thousand, and can now be obtained from the Oakville Basket Co., and perhaps from other Canadian firms. As those sold in Canada are only eighteen inches in length, it is necessary to use two for each tree, if it is desired to protect trees from sunscald, although we believe a longer veneer could be obtained if specially ordered.

For the past two winters an experiment has been conducted at Ottawa in painting the trees to protect them from mice. In neither of these winters have the mice been very bad at Ottawa, so that the results so far are not very conclusive as regards protection from mice. It may be said, however, that none of the painted trees were injured by mice, while a few of those left unprotected were injured. It may be stated also that no injury to the trees from the paint has so far been observed. Paint has been used at the Virginia Experiment Station for more than fifteen years with good results, they not having had an apple tree injured. It is not, however, recommended for peaches and cherries as some injury occurred from the use of it on these fruits. If paint is tried it should not be bought ready mixed as it may have some injurious mineral oil. White lead and pure linseed oil should be mixed together to a consistency about the same as for an outside coat on a building. The tree should be heavily coated with this.

There are a number of washes and poisons recommended for the protection of the trees and the destruction of the mice and rabbits, but none of these are very satisfactory, as if the mice or rabbits are numerous the poison has not sufficient effect upon them to prevent injury altogether.

In Manitoba rabbits are very troublesome. The fruit growers there can protect the trunks of the trees when there is a single trunk, but as their trees branch from the ground in many cases it is very difficult to protect them, and to ensure the safety of the trees the whole of the lower part of the tree should be protected and this cannot be done very well except with a spray. We have suggested spraying with paint. That is a good field of work for the new Professor of Horticulture at the Manitoba Agricultural College.

We shall now discuss the question of treating the trees after they have been injured.

If a tree is badly girdled by mice it usually dies. If as soon as the wound is noticed it is cleaned and covered with grafting wax or some paste, such as cow dung and clay, and wrapped with cloth to exclude air and prevent the wood from drying out, there is a possibility of saving the tree if the girdle is a small one, as the sap which rises through the wood will continue to do so, and returning through the inner bark in an elaborated condition will cause growth to be made all around the upper part of the wound, and if the latter be not too large there is a chance of its healing over. If, however, the wood becomes dry before the bandage is put on, the tree will almost certainly die, although it may continue to grow throughout the season. When the wax and bandage are applied the tree should be headed back considerably to lessen the amount of transpiration of moisture, as there will not be as much sap rise as if the tree were uninjured, and the wood will thus dry out sooner than if it were headed back. If the girdle is near the ground, in addition to covering the injured part with wax or cow dung and clay, it is advisable to mound up the soil about the tree to cover the wound and thus help to prevent the wood from drying out.

Girdled trees are frequently saved, and more surely saved than by the above method, by connecting the upper and lower edges of the girdle with scions, which are inserted all around the trunk. The more scions that are used the quicker they will grow together and form a new trunk, but two or three scions successfully grafted on a small tree will carry enough sap to keep the tree alive. The larger the tree the more scions should be used. A slanting cut is made at each end of the wound in the uninjured wood in which the scions are to be inserted. Strong, plump scions of the previous season's growth—not necessarily from the same tree, nor even the same variety—cut a little longer than the distance between the slanting cuts, are made wedge-shaped at each end. They are made a little longer than the distance between the cuts in order that when inserting the ends into the cuts it will be necessary to bend them, and thus have them under pressure, which helps to keep them in position. When inserting, some of the inside bark of the stock should come in contact with some of the inside bark of the scion, as it is here or at the cambium layer where union takes place. As soon as the scions are all placed the wounds, especially about the ends of the scions where inserted in the stock, are covered with melted wax. The ends are also at the same time bandaged with a cloth around the trunk to aid in keeping the scions in place and to exclude the air. The tree should then be well headed back. The scions, if properly made and inserted, should soon unite with the stock and then carry the sap to the top of the tree.

Another method of bridging is to cut back the uninjured bark evenly all round the trunk and insert the wedge-shaped scions underneath the bark at the upper and lower ends of the wound. There are other methods also employed, such as using a scion bevelled at each end. Also, boring holes with an augur at each end in the uninjured bark, and shaping the scion at each end so that it will fit into it. One of the most satisfactory methods of utilizing the girdled tree is to cut it off close to the ground and insert a scion of some good variety. This graft should grow at least three feet in height the first season and make a nice young tree.

**Mr. CUTTING:** One grower told me that he had obtained good results from the following method: He did a small portion of his pruning early in the winter and afterwards allowed a small pile of twigs to remain on the ground midway between the trees. These acted as a decoy as the mice preferred the twigs to the older wood of the tree trunks.

**Mr. ARMSTRONG:** I consider that wrapping the trunks with tar paper is the most effectual and cheapest method.



A MEMBER: Grain poisoned with an arsenic solution and scattered around the fences is a good preventive. It should be done in the fall just before freezing up.

MR. HILBORN: The veneer is cheaper than paper, because it lasts for two seasons and is put on more quickly than the paper. It also protects the trees from severe cold. We get it cut into pieces about 12 x 18 inches and costing \$2.50 per thousand.

MR. W. M. ORR: I have used tar paper on thousands of trees for years with perfect success.

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## THE STRAWBERRY.

W. F. W. FISHER, BURLINGTON.

To the apple is universally ascribed the title "King of Fruits," no one for a moment questioning its claim to the position. Equally unquestionable is the merit of the Strawberry, the subject of the present address, to the next highest position of rank, namely "Queen of Fruits," large or small, and equally universally is it accorded its true position.

The term small, with its possible double interpretation, is scarcely applicable to the strawberry; it would rather be more correctly applied to the man who does not enjoy the strawberry season. Probably the feelings of every person present would remain unruffled if we were to say that the man who does not appreciate this luscious, delicious, healthful fruit is either pitied or despised by his fellow creatures.

The strawberry is more cosmopolitan in its adaptation to soil, climate and conditions as well as to palates, than any other known fruit. It grows and flourishes in the sunny south, it is found smiling its welcome in the early spring, and in its season tempting the appetite of the dweller on the prairie of the far north, and at practically all points between, it is possible to produce this fruit. Apart from its intrinsic merit, probably one of the joys with which the strawberry is received is due to the fact that it is the harbinger of the season of fresh fruits extending throughout the year, until its own season comes again.

The importation of strawberries from the United States, it was feared by many, would result in weakening the appetite of consumers and lowering the price of the home grown article. The history of demand and average prices for the past ten years shows a contrary effect, and with the increase of importations and the trebling of the acreage under home grown berries, the demand and price have kept full pace.

Now a few words as to cultivation. The old saying that in order to properly train a child one should have begun with its grandmother, applies with full force here; for, if land has been liberally fertilized, and tilled in such a manner as to keep down all weeds for two or three seasons previous to its being planted with strawberries, half the battle has been fought and won; and with ordinary intelligence applied to later operations success is ensured. While, as we have already stated, this fruit will succeed to a remarkable degree on a variety of soils, the ideal one, in the speaker's estimation, is a rich sandy loam with a quicksand subsoil not too near the surface, but still from which a considerable evaporation of moisture is continuous throughout the season of ripening. Having selected the most suitable soil available, it should be well fertilized and fall plowed. Spring cultivation

should begin early in order to retain moisture, and, in cases where the soil is heavy, to keep it from becoming hard. When ready to plant, which should be during the first half of the month of May, plough deep, harrow, and roll firmly.

The choice of varieties depends largely on extremely local conditions and also on the object had in view as to producing berries for the early market or berries of high quality adapted to stand up under long distances of transportation. As in our tree fruits, many growers fall into the error of needlessly multiplying the number of varieties. Choose judiciously, and keep the number for a commercial plantation down to two or three. A new and profitable demand will be created as soon as large plantations of single varieties of the right sort are offered to buyers. The plants should be taken from well wintered young beds, and all weak plants discarded, trim off all runners and dead leaves, lay the plants straight in a carrying basket, sprinkle well with water and cover to exclude the air. Then they are ready for the field. Planting should be done as expeditiously as possible after digging.

The distances between rows and between plants depend somewhat on the views of the individual grower, and the habits of the variety of strawberry. Rows are popularly placed at distances from three to four feet apart. We prefer the former for the rows, and from fifteen inches to two feet for the plants in the row. Probably the most common form of planting is for one man to carry a spade in one hand and a basket of plants in the other hand, while another man or boy puts the plants in the holes made by the spade and each presses a foot to the earth at the roots of the plant as they pass on. In this manner an active man and boy will plant about one half an acre per day. As soon as planting is through, they should be cultivated and hoed to retain moisture, and to prevent the air from getting at any roots not entirely covered. After this, cultivation should be frequent, about once a week for the first two months. Early runners should be turned into the row, as they invariably form the strongest plants, and the rows should not to be allowed to become matted by late setting plants. Some of our most successful growers allow each parent plant to set but two young plants on either side, but this system of cultivation called the hedge row, is not general, nor is it conceded that it is, generally speaking, practicable. When the frosts of December come, the rows should be mulched in such a way as to protect the plants from the severity of the winter. The following spring cultivation is again necessary, especially if the plantation is to be maintained for a second year's picking.

Now comes the rub: To get the berries picked carefully, regularly and promptly is the knotty part of the problem. Provision should be made a season in advance for a supply of pickers, and these require a great deal of tact in managing. Picking is done by piece work at the generally uniform rate of one cent per box; but a premium of some kind might be given all pickers who by skill and neatness bring in their berries in the most attractive and saleable condition.

Marketing is the next feature in order, and on the services rendered, rather than on the prices charged, by the transportation companies, depends the success or failure, to a greater or less degree, of all our efforts up to this stage. When the crates are thrown three or four feet by a stupid, careless expressman, and landed in one of the old fashioned stuffy ovens, which are still designated express cars, or when the trains run into market three or four hours late, the result is quite different to that obtained when they are reasonably handled, deposited in a well ventilated car, and delivered at their destination on schedule time.



The distribution of the crop is one of the most important factors, and we think the ordinary grower would do well to confine shipments on commission to the larger centres, and allow buyers at local points to supply smaller markets. If all the mouths in the Dominion are given access to a full allowance of strawberries, we need not fear a glut in future markets.

We have here outlined a system involving a large amount of labor, care and expense. What result should the average grower expect from such a system fairly carried out? Placing the average crop at, say, 7,500 quarts per acre and the average price at 6 cents at railway station, we get thus the sum of \$450 as the gross receipts per acre. From this deduct the following charges: Plants required, \$25; cultivation, \$25; fertilizers, \$35; rent, \$15; picking, \$75; packages, \$75; packing and delivering, \$25; a total of \$275, leaving a net profit of \$175, a sum which every intensive cultivator may confidently expect to exceed, and yet which compares favorably with other branches of fruit growing.

Q.—What varieties give you the best results?

A.—If I had not planted any variety except the Williams during the past twelve years, my profits would have been on an average of \$1,200 per year greater than they have been.

Q.—You stated that your practice is to have your rows 3 feet apart and 15 in. apart in the row.

A.—Yes, about 3 ft. or 3 ft. 3 in. for weak varieties; for others 3 1-2 ft.

Q.—We find that with 3 ft. rows the plants entirely cover the ground by fall and we cannot continue cultivation.

A.—You should not let your row get that wide. We cut off the runners by cultivating between the rows. Wide rows exhaust the moisture in the soil, and the pickers destroy the plants and fruit when the rows are too wide. A width of about 1 ft. is very satisfactory, or it may be made 15 in. We do not cut off the surplus runners but keep them down by cultivation close to the original plants.

Q.—Would not that throw them into the row and make your row unduly thick?

A.—We try to avoid that by allowing sufficient distance between the plants when we set them out in the spring.

Q.—Did you ever practise cultivating both ways for a time?

A.—Personally I have never done so, but some of the growers do it.

Q.—I practised that method this year with much satisfaction and saved a great deal of expense of hoeing.

A.—We put our plants a little closer together on account of our soil. We do not get as rapid growth on lighter soil.

Q.—How do you handle your beds after picking so as to prepare for the second year?

A.—I regard it as very important that, just as soon after packing as you can attend to it, the patch should be cleaned up. Narrow the rows down pretty thoroughly either with a plow or a cultivator, and work up the ground well between the rows.

Q.—Are you in favor of mowing and burning the plants after the first crop?

A.—I cannot say that I would personally recommend it. Situated as we are where we can get labor, I prefer to hoe them. We have our plants cultivated by the people who do the picking. We can get Indian pickers

from the Grand River Reservation, and when there is no picking to do, they are ready to do the hoeing. We take them on in the spring and keep them through the season, helping us with all our fruits.

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## REPORTS FROM SHIPPING ASSOCIATIONS.

### BURLINGTON ASSOCIATION.

A. W. PEART: We have a good co-operative shipping system which has been in existence for 20 years. I can bear out the testimony of Mr. McNeill as to the efficiency of the service now rendered by the transportation companies. We are getting a good service to Montreal, and only once have we failed in connecting with the boats when we have given the car two days and three nights in which to do it. With us pears are as important as apples for export trade. Our Bartlett pears arrived too green this season, but sold at a fair price. Clapp's pears surprised us by outselling the Bartlett. The Duchess is the only pear that has outsold Clapp's.

### FOREST ASSOCIATION.

A. LAWRIE, Secretary: Our Association has been in existence for about three years, and during that time we have made considerable progress both in the cultivation of our orchards and the production of a good quality of fruit, and also in the shipping of the product to the North-West and the Old Country. We have aimed to get a membership of fruit growers that will take care of their orchards. In this way we secure a quality of fruit that commands a ready sale in the market. This year we have consigned our fruit for the most part to the Old Country, and some returns from our shipments are already to hand. Our first shipments, consisting mainly of Fall Pippins, Ribston Pippins, and Maiden's Blush, netted us \$2 for firsts and seconds. Our later shipments we have not definitely heard from as yet. We still have a considerable amount of our product on hand. Our membership this year is about thirty, and an increasing interest is being taken by the members in the care and culture of their orchards.

### NEWCASTLE ASSOCIATION.

W. H. GIBSON, President: This is our first season and we have a membership of only seven as yet. Our season has been successful financially, and we took the somewhat unusual course of selling our fruit to a dealer. We did so for the reason that the dealer, who was constructing a cold storage building, made an agreement with us, whereby we were to give him our apples, the price arranged for being \$2.25. Some of our neighbors who did not belong to the Association did not receive nearly as much. One of our rules was that each member must spray his orchard a certain number of times, and when we came to gather the crop we found that the fruit had been greatly benefited thereby. Where the orchards were thoroughly sprayed, there was not two per cent. of wormy apples, while neighboring orchards had 50 per cent. In one orchard I counted 154 apples on a tree, one-half of which were wormy, and on the ground I counted 170 that had dropped from the same reason. In the Association orchards very few apples had dropped during the season.

Q.—What mixture did you use?

A.—Bordeaux and Paris Green, from six to seven ounces of the latter.



The apples we grow are of the late winter varieties, mostly Stark, Ben Davis, Baldwin, Spy and Russet, apples which to get the best market should be held till late winter or spring. A large number of orchards are being planted in our section and people are very enthusiastic over winter apple growing.

Mr. G. C. CASTON, Craighurst: Speaking about spraying, I should like to ask whether anyone here has used Swift's arsenate of lead instead of Paris Green for codling moth. One disadvantage of Paris Green is that it is washed off by rain, and does not remain in sufficient quantities to be always effective. It is claimed for arsenate of lead that it will cling to the tree like glue. It is also claimed that it will not burn the foliage if it is used separately, and it is not necessary to use lime. I should like to hear the experience of growers on this subject.

Mr. WALLBRIDGE, Belleville: I have been troubled with codling moth in my orchard, and Paris Green did not seem to have much effect. I used arsenate of lead for the first time this season. I gave three applications, all being made after the blossoms dropped, and I did not have more than five per cent. of wormy apples. After the trees have been sprayed the leaves seem to show the mixture for some time afterwards, notwithstanding rain. I use three pounds to the barrel, and it costs fifteen cents per pound by the fifty pound keg. I have used it with Bordeaux mixture and also alone.

Q.—Did you use the same quantity when mixed with Bordeaux?

A.—Yes. For the first application I used three pounds to the barrel, for the second two pounds, and for the third one pound.

Secretary HODGETTS: In our power spraying demonstrations we used it at Meaford and had very good success with it, using it along side of Paris Green. It held up better in the Bordeaux mixture and stuck better to the fruit, but we did not see much difference in the results.

Mr. DEMPSEY, Trenton: I used it this year and could see no difference between it and Paris Green. I found that it gave better results with potatoes than Paris Green.

#### OSHAWA PACKERS' ASSOCIATION.

ELMER LICK, Sec.: The first object aimed at by our Association was to obtain for the growers what might be considered a reasonable price for their apples. This year on the borders of Pickering Township we had a good opportunity to compare the results obtained by our method of handling and shipping with the customary mode of disposing of the apple crop in the case of two adjacent orchards. One was sold to the buyer at less than fifty cents a barrel for the packed apples; while in the other orchard, which was not composed of such desirable varieties, the grower will net anywhere from \$1.30 to \$1.70 a barrel for the apples, packed and delivered. This year we have taken fruit from 28 to 30 orchards, comprising 4,800 to 5,000 barrels. So far we have shipped 900 barrels and there will be scarcely any difference between returns received and the price we asked, and we asked a pretty high price for our choice fruit. We have had a little difficulty this year with some of our growers picking their fruit before it was ready. Another difficulty has been the persistent efforts of dealers to buy apples from men in our organization. One dealer made an indefinite offer to one of our members, putting it in this way: "Would you take \$600 for the fruit of your orchard?" We shall succeed in getting him a little more than that for his crop. We take care to pack our fruit as carefully and as quickly as possible. We endeavor with fall varieties to pack within forty-eight hours of the time the fruit comes from the grower.

## ST. CATHARINES COLD STORAGE AND FORWARDING ASSOCIATION.

ROBT. THOMPSON, Pres.: Our company shipped 160 cars during the season, about 60 of them being sold f.o.b. at our station. 64 cars netted a little over \$30,000. The majority of the cars we sold to commission men, who expressed satisfaction with this system of buying. Our Association bought 250,000 baskets wholesale, and thus we were fortunate in avoiding the basket famine which afterwards came about. Our spraying materials and supplies were all bought in this way. We obtained one car of boxes from British Columbia for tomatoes, peaches and apples. We like these boxes better than those made here. Not only have they a better appearance, but they hold the nails far better.

## SIMCOE ASSOCIATION.

Although this is our first year, and we had the usual difficulty in getting the farmers to co-operate, we have a membership of about twenty. We accepted no one as a member who would not spray at least four times. Our experience is that unless our orchards are thoroughly cultivated and sprayed, a good quality of fruit cannot be produced. Many who refused to join our Association last spring are now very sorry, because they are out of pocket by not doing so. We intend erecting a storehouse and also an evaporator in Simcoe to utilize the waste products of our orchards.

## TRENTON ASSOCIATION.

W. H. DEMPSEY, Trenton: Our organization is scarcely on a running basis as yet, although we have handled considerable fruit this year. Probably 3,000 barrels of early apples have been shipped to the Old Country and brought very good prices, one consignment bringing \$2.55 net. Our winter varieties are in storage at the present time ready for sale or export. It has been very gratifying to the Association to learn from the members that many of them have received so far for their early apples as much as they got for their whole crop in past seasons. We have not made any stringent rules about spraying as yet. Those who do not take care of their orchards will certainly see where they stand, and we have no doubt they will be induced to spray as a result.

## BELLEVILLE ASSOCIATION.

F. S. WALLBRIDGE: This year, we made two consignments of early fruit and obtained from \$1.75 to \$2 a barrel. We put our other apples in cold storage, and have on hand from 1,500 to 1,800 barrels of Ben Davis, Golden Russet, etc. We prefer to sell our fruit as a rule rather than consign it.

## ARKONA ASSOCIATION.

We have had great success since our Association was formed by Mr. Sherrington two years ago. The first year we had a membership of eight and shipped only one carload of apples. This year we shipped seven carloads and our returns have been very satisfactory. Early in the season the Department of Agriculture conducted a demonstration in power spraying in our neighborhood, with the result that many are starting to spray their trees.

MR. A. B. CUTTING: Many of you are doubtless aware that a Provincial



association has been formed, known as the Ontario Co-operative Fruit Growers' Association, although its name will have to be changed, as it conflicts with the name of this organization. This is a co-operative movement among the co-operative associations. It is purely commercial in its object and design, and is intended to be a medium through which the local associations may secure reliable information as regards crop prospects, conditions and prices, not only in Ontario, but all over Canada and as far as possible in other countries. The organization will also endeavor to promote better methods of orchard handling, and the formation of local co-operative associations, where these do not exist at the present time.

Mr. G. C. CASTON, Craighurst: I desire to take this opportunity of uttering a warning in reference to the fruit trade. I am credibly informed that a certain amount of trash is still being shipped to the North-West from Ontario. The people there are paying as much for it as should secure them good apples. This sort of thing is bound to injure the business and also our reputation with the people there. I am also informed that a great number of apples are being shipped into the Algoma District without bearing any stencil marks on the package. This is a matter to which the attention of the Department at Ottawa should be drawn.

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#### VOTE OF THANKS.

On the motion of Mr. W. H. BUNTING, seconded by Mr. G. C. CASTON, it was resolved that:

The Association desires to express its appreciation to His Worship, the Mayor, and the Board of Control of the City of Toronto, for so generously granting the Association the use of the rooms in which its sessions have been held.

It was moved by Mr. THOMPSON, seconded by Mr. STEPHENS, and resolved that the thanks of the Association be tendered to the directors who are retiring owing to the provisions of the new constitution, for what they have done on behalf of the Association in the past, and to express the hope that, should the future demand it, they will ever be found ready to once more assume the duties of the office.

The President: On behalf of the retiring Board of Directors I can assure you that we appreciate very much the spirit of the resolution you have been good enough to pass. I wish to thank all who have attended our meetings for the deep interest taken in the affairs of the Association. I have been very much gratified at the large attendance, and consider that this has been one of the most successful meetings I have had the pleasure of attending.

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# APPENDIX "A."

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## REPORT OF THE HISTORICAL COMMITTEE.

BY LINUS WOOLVERTON, CHAIRMAN, GRIMSBY.

### *Preface.*

The Ontario Fruit Growers' Association has accomplished so much for the advancement of the industry during the last forty years, that much honor is due to those who organized it and to those who afterward gave their time and talents to the direction of its affairs.

The first president was Judge Campbell, of Niagara, who was elected at the organization meeting held in the Mechanics' Hall, in Hamilton, in January, 1859. This meeting was called at his suggestion, in conference with D. W. Beadle, of St. Catharines, and Mr. George Leslie, sr., of Toronto. There were only eighteen persons present at this first meeting, only one of whom is still living, viz., Mr. A. M. Smith, of Port Dalhousie. In January, 1861, the second annual meeting was held, at which Judge Logie, of Hamilton, was appointed President, and D. W. Beadle, Treasurer. It was soon found best to unite the office of secretary and treasurer, and the two were combined and given to Mr. Beadle, of St. Catharines, who served the Association with distinguished ability until the year 1886, a period of twenty-five years. He was then succeeded by Mr. Linus Woolverton, of Grimsby, who held the position of Secretary-Treasurer, and Editor of *The Canadian Horticulturist* until the year 1902, a period of sixteen years. The work then requiring division, Mr. G. C. Creelman, of Toronto, was made Secretary-Treasurer, and held the position until 1904, when he was appointed President of the Ontario Agricultural College, and gave place to Mr. P. W. Hodgetts, the present Secretary.

While the office of secretary was held continuously by two or three successive persons, that of president has been filled by a long list of worthy gentlemen, who have given direction to the affairs and dignity to the meetings.

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### CHARLES ARNOLD.

A native of Bedfordshire, England, where he was born in the year 1818, Mr. Arnold removed to Paris, Ontario, in 1833, and twenty years after established the Paris Nurseries. Always busy in the interests of scientific horticulture, he was chosen a director of the Ontario Fruit Growers' Association at its very commencement, a position he held to the day of his death. He was an enthusiastic hybridist, as the many varieties of grapes, apples, raspberries, etc., originated by him, bear witness. In 1872 he obtained a gold medal at the Hamilton Fair, for a new and valuable variety of white wheat; but the most fortunate of his productions in this direction was the American Wonder Pea, for which he received from Messrs. Bliss & Sons, of New York, the handsome sum of \$2,000.



The last meeting of our Association, at which Mr. Arnold was present, was in January, 1883, and he was accompanied by Mrs. Arnold. It was on this occasion that he read to us a poem of his own, entitled "A Seat on the Hill-top beneath the old Tree," of which the second stanza runs thus:—

How can I but love thee, thou sacred spot?  
And think of the loved ones who were, but are not,  
When I view thine old trunk draped o'er with the vine,  
The Wood-vine and Pipe-vine thy branches entwine;  
And could but those dear ones who planted them there  
Sit again by my side these blessings to share;  
There's nought in this wide world I'd barter for thee,  
My seat on the hill top beneath the old tree.

At the summer meeting following, it was our sad duty to pass a resolution regretting his loss, as that of one who "during his long life labored with great industry to advance the interests of fruit culture in this country, and by his efforts to improve our fruits and grains by cross fertilization, and has, while benefiting his own province, gained a world-wide reputation."

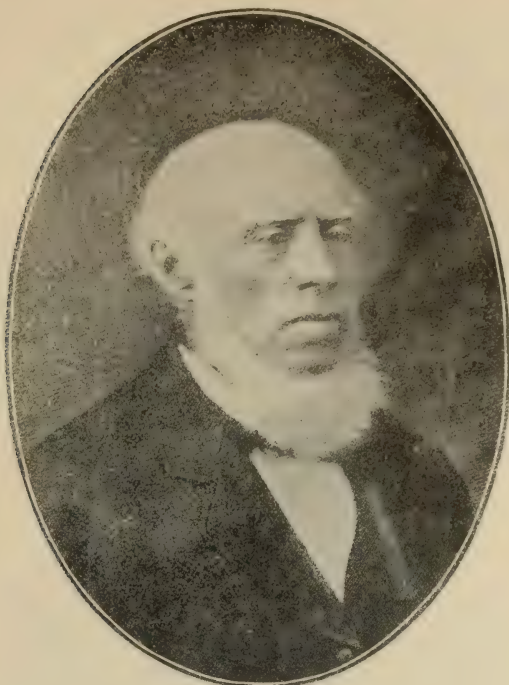
The following valuable notes on Mr. Arnold's labors as a horticulturist, have been contributed by D. W. Beadle, who as Secretary of the Association, had full cognizance of all his work in this direction:—

"Mr. Charles Arnold was, I believe, the pioneer in experimenting in the line of cross fertilization, with the view of producing new varieties of fruits in Canada. His first attempts, as far as is known, were made with the grape. In his first experiments he took for the mother plant a wild vine of, if I mistake not, the *Aestivalis* family, and impregnated the flowers with pollen of the *Vinifera* tribe. From the seed thus produced he raised a number of seedlings, some of which seemed to be well worthy of cultivation, which he named Othello, Cornucopia, Autuchon, Brant and Canada. These are fully described in the Bushberg Catalogue of 1883, from which we learn that they were much esteemed in many parts of France. However, they do not seem to have been well adapted to the climate of America, being too subject to mildew and rot. The raspberry received attention from Mr. Arnold, and he raised quite a number of crosses between the Antwerp tribe and a White Cap. None of these proved to be of permanent value, exhibiting often a great tendency to sport back to the original Antwerp. His crosses of the apple have been of more value to us, and one of them, the Ontario, is being grown successfully in many parts of this Province.

Mr. Arnold gave also considerable attention to cross-breeding of wheat, and produced several varieties of that cereal. Whether any of these have proved to be of special value, I am not informed. His greatest success was in the production of cross-bred peas. By crossing the Champion of England with Tom Thumb, he produced a pea having the rich flavor of the Champion of England, and the dwarf habit of the Tom Thumb. This pea has been widely disseminated as the American Wonder, and is yet to be found in some of the seed catalogues.

The above is a brief account of Mr. Arnold's labors in cross-fertilization. He led the way, others have followed; among them the late Mr. W. H. Mills, of Hamilton, and Wm. Saunders, now Director of the Dominion Experimental Farms. Mr. Mills confined his labors to the grape; but Mr. Saunders took in the whole field of fruits in his experiments.

Mr. Arnold thought several of his cross-bred apples worthy of a name, among them being Arnold's Beauty, Ella, Dora, and already mentioned, Ontario."



CHARLES ARNOLD.

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DELOS W. BEADLE, B.A., LL.B.

17 October, 1823—30 August, 1905.

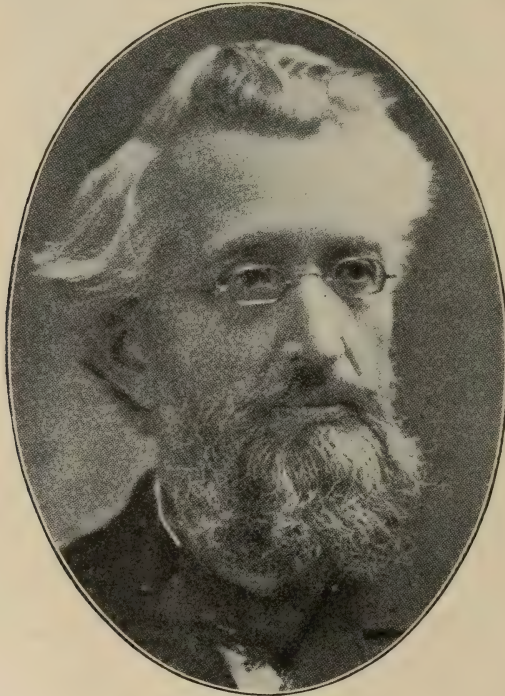
During the year 1905 there passed quietly away in the city of Toronto one of two then living constitutional members of the Ontario Fruit Growers' Association, in the person of Mr. Delos W. Beadle. To this gentleman in no small degree, is due the early progress and development of the fruit growing interests of this Province, and some lasting tribute to his memory is justly due from this Society.

Mr. Delos W. Beadle inherited a taste for horticulture from his father, Dr. Beadle of St. Catharines, who was one of our earliest Canadian nurserymen. He was born in that place on October 17, 1823, and was prepared for college at the Grantham Academy, now the St. Catharines Collegiate Institute. In September, 1841, he entered the sophomore class in Yale College, New Haven, Conn., where he obtained his B.A. degree in July, 1844, and two years later he received his B.A. (*ad eundem*) from the University of Toronto. In 1847 he received his LL.B. degree from Harvard University, Cambridge, Mass., and in 1848 he was called to the bar in New York City, where he practiced law for about 6 years. His failing health made it necessary for him to seek an outdoor life. He accepted from his father an interest in the nursery business, in which line he continued until his retirement in 1887.

When the Hon. George Brown began the publication of the Canadian Farmer, Mr. Beadle undertook the charge of the horticultural department and continued to edit it for several years.



In January, 1859, the Fruit Growers' Association of Upper Canada was organized in the City of Hamilton with 18 members. Judge Campbell was the first president, and Arthur Harding, the first recording secretary. On the 16th of January, 1861, Judge Logie of Hamilton, was elected president and D. W. Beadle, secretary, a position which he filled for twenty years with such distinguished ability, that his statements on matters horticultural were everywhere in Canada looked upon as authoritative and reliable. Dr. William Saunders in his annual address, as president in 1884, says of him: "While I acknowledge with pleasure the valuable aid rendered by my much esteemed predecessors in the presidential chair, the lamented Logie, W. H. Mills, Dr. Burnet, and P. C. Dempsey, and esteem it an honor to wear their mantle, I feel free to say with no fear of contradiction, that the Fruit Growers' Association owes its present high position and influence more to its able secretary than to any other man belonging either to the past or to the present."



D. W. BEADLE.

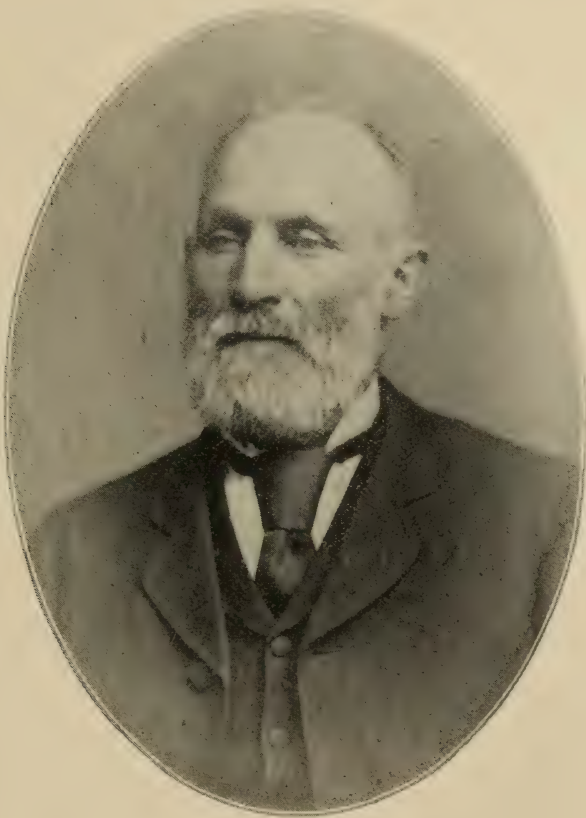
At the suggestion of Mr. Beadle, the publication of the Canadian Horticulturist was undertaken in January, 1878, by our Association. His idea was that such a publication would serve to hold together the membership by affording a means of constant intercommunication of ideas, suggestions and experiences in horticulture throughout the round year. As an evidence that Mr. Beadle's abilities were recognized abroad, we may add that on the 10th of November, 1862, he was elected corresponding member of the Horticultural Society of London, England.

In the year 1887, Mr. Beadle sold out his nursery business in St. Catharines to the D. W. Beadle Nursery Company. At the same time he resigned as secretary of the Ontario Fruit Growers' Association and editor of the "Canadian Horticulturist." His most valuable book, "The Canadian

Fruit, Flower and Kitchen Gardener," was dedicated to the President and members of the Ontario Fruit Growers' Association. The rest of his life he spent in Toronto, a student of nature and botanical research until his lamented death, the 30th of August, 1905.

### PETER C. DEMPSEY.

More than a hundred years ago Mr. Dempsey's grandfather, a United Empire Loyalist, settled at Albury, Prince Edward County. Fond of fruit culture, he brought seeds along with him, from which he started a nursery,



P. C. DEMPSEY.

principally of apple trees, some of which are still living and bearing fruit upon the old homestead. Cider was made in large quantities from this orchard in early days, and during the war of 1812 proved a very profitable business, bringing him high prices by the hogshead.

Thus, growing up among orchard trees, Mr. P. C. Dempsey early developed a taste for fruit culture, and in the year 1857, finding the confinement of office work too great for his failing health, he decided to devote his whole attention to horticulture.



Soon after, hearing of the good work being accomplished by the Fruit Growers' Association, he became a member, and was first elected a director in the year 1873. A fluent and pleasing speaker, he was always heard with interest by all in attendance, and honored by his election, in the year 1875, to the position of Vice-President; and in 1880, and again in 1881, to the highest gift in the power of the Society to bestow, viz., that of president.

Mr. Dempsey was sent to the Centennial Exhibition, in company with Colonel McGill, of Oshawa, in charge of our exhibit of Canadian fruit, the medals from which are still in possession of our Association; and in 1886 he was employed by the Dominion Government, in company with Mr. A. McD. Allan, to have charge of Canada's fruit exhibit at the Colonial and Indian Exhibition.

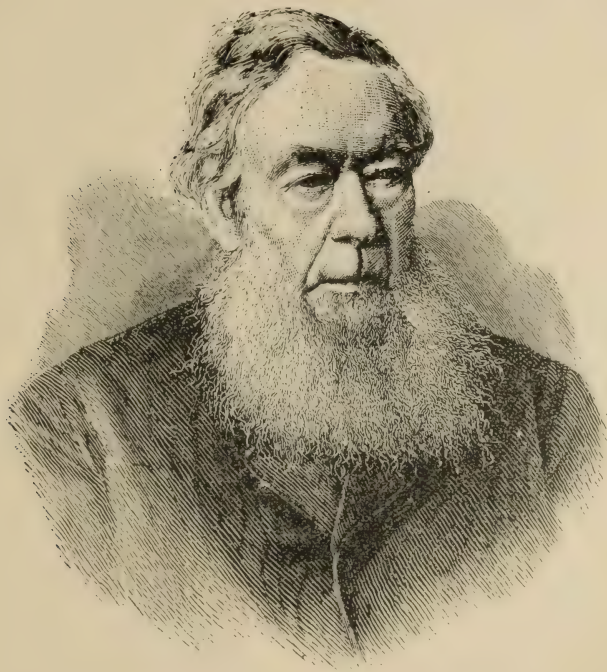
Mr. Dempsey's name is deserving of special notice in historic records for his devotion to the art of producing new varieties of fruits by hybridization. This subject was a favorite study with him, and he was successful in giving to us several interesting and valuable fruits; as for example, the Burnet grape, the Trenton apple, the Dempsey pear, and the Dempsey potato. The Dempsey pear is a cross between the Bartlett and the Duchess, partaking of the excellencies of both, and is later in season than the Bartlett. The Trenton apple is a cross between the Golden Russet and the Northern Spy. It has somewhat the appearance of the Fameuse family, but is larger and the color a deeper crimson.

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### GEORGE LESLIE.

Mr. George Leslie, whose name is associated with the earliest meetings of our Association, was the second son of Wm. Leslie. He was born in Sutherlandshire, Scotland, in 1804. At the age of sixteen he went to Tarlogie, Rosshire, and served an apprenticeship of three years in the gardening profession. He then, under the same proprietor, took charge of the garden, hedges, etc., at Arrabella, where he remained two years. On the first day of April, 1825, being his twenty-first birth day, he with his parents and six brothers and a sister, set sail for America, and after a passage of six weeks landed at Quebec. He immediately obtained employment. In the October following he came to Little York, now Toronto. At that time there were only five brick stores on King Street, all situated east of the market. He at once went to Streetsville, whither his father had preceded him, and chopped in the bush all winter. In the spring he returned to Toronto and entered the service of the late Hon. George Crookshanks, Commissary General. He remained with him one season, and then for several years acted in the capacity of gardener and florist for the late Hon. Wm. Allan, father of the Hon. Geo. W. Allan; the late Hon. John Henry Dunne, Receiver-General; the late Chief Justice Sir Wm. Campbell; the late Bishop Strachan, and others. In 1830 he purchased, from the Rev. Jas. Beatty, the old homestead at Streetsville, previously occupied by his father, a portion of which he cleared and improved. In 1837 he located permanently in Toronto, leasing Russel Abbey Square, bounded by Caroline, now Sherbourne, King, Princess and Front Streets, with all the buildings thereon, using the ground for the growing of shrubs, flowers, vegetables, etc. He soon after established himself in business as a grocer and seed merchant. His first stock of seeds was brought from London England. In 1838 the

Gas Company erected their works just south of the premises occupied by him, and his store was the first building in the city lighted with gas, crowds coming to view the new illuminant. He subsequently transferred his business to Yonge Street upon the present site of the Bank of Commerce, where he remained until 1845, when the city purchased the property for the purpose of opening up Colborne Street, paying him the sum of \$5,000 in corporation debentures. He then leased twenty acres east of the Don river for a period of 21 years, where he began business as a nurseryman, florist and gardener. He subsequently purchased this and adjoining properties to meet the requirements of his business, which increased most rapidly. He was an active member of horticultural and agricultural societies



GEORGE LESLIE.

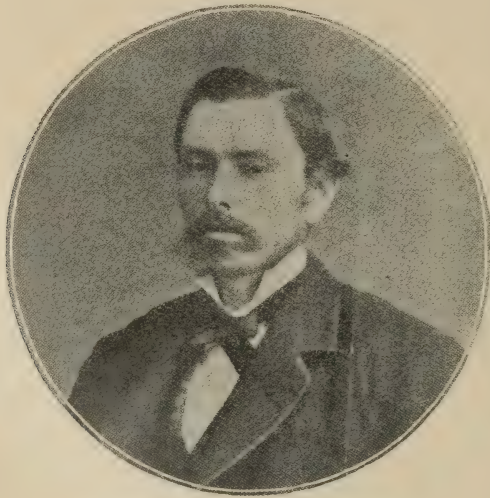
for many years, and a life member and director of the Horticultural Society and Botanical Gardens of Toronto. During the 43 years that he was established in business he was awarded at exhibitions many gold, silver and bronze medals, a large number of diplomas and hundreds of other prizes for superiority of productions. In the year 1880 a special silver medal was presented to him by the Agricultural and Arts Association of Ontario. The inscription thereon reads: "To Geo. Leslie, sr., in grateful acknowledgement for his horticultural efforts, by the Council of Agriculture and Arts Association of Ontario." When the first fire company was formed in York he became a member. In 1853 he was commissioned a magistrate by the Hon. Robert Baldwin, the duties of which office he discharged with fidelity. He filled the office of school trustee for nine years and was for one year alderman for the city, but did not seek re-election, not being inclined to neglect his business to engage in political strife.



## CHARLES GIBB.

At our summer meeting at Picton, Ontario, in 1888 we had with us a friend of Canadian horticultural who deserves an exalted place in our roll of the fathers of Canadian horticulture. Little did we think, as we climbed the white sand cliffs of Prince Edward County, in his company, that we should soon after hear the sad news of his passing.

Mr. Charles Gibb was born at Montreal on the 30th of June, 1846. He received his early education at Bishop's College, Lennoxville, and went from there to McGill College, Montreal, where he graduated B.A., at the age of nineteen. The application necessary to complete a college course successfully at so early an age, not only injured his eyesight, but also much impaired his health, and he was told by physicians that he had only a few



CHARLES GIBB.

years, perhaps only a few months to live, and they advised him to seek recuperation in foreign travel. This he did, going abroad in company with his uncle, Mr. J. J. Gibb, of Como. This first trip was of two or three years' duration, and embraced visits to Egypt, the Holy Land, and afterwards Switzerland and Europe generally.

On his return he engaged in the cultivation of fruit, in the State of Pennsylvania, no doubt because he rightly considered it one of the most healthful, as well as one of the most interesting departments of agriculture. The climate of Pennsylvania not agreeing with him, he returned to Canada, and purchased the farm on the slope of the Yamaska mountain, at Abbottsford, so well known to us all of late years, on account of the interesting experiments with Russian and other hardy fruits which he has carried out there.

In 1873 he made repeated trips to the United States, studying the pomology of that country, bringing everything worthy of trial to his farm, not merely in sufficient quantities to stock his own farm, but also enough to make free distributions of trees and plants to his neighbors.

In 1882 Mr. Gibb, in company with Prof. Budd of the Iowa Agricultural College, went to Russia in quest of the most hardy fruits which might be expected to endure the extremes of temperature to which the northern parts of Canada and the United States are subject. Prof. Budd had already made a large collection of hardy fruits at Ames, but so little was definitely known of the names and values of the various Russian fruits that it seemed necessary that some one should go to Russia charged with this errand. Speaking of it afterward Mr. Gibb, with his characteristic modesty, said: "Northern horticulturists were looking with great hopes to Russian fruits. The work could not be allowed to rest. Some one must go to Russia; Mr. Budd and I went." On pages 192-230 of our report for 1883, may be seen a full report of this journey, written by Mr. Gibb, who, it is well worth noting, took this costly journey at his own expense. This trip was followed by importations of trees and seeds which were distributed to the members of the different Fruit Growers' Associations of the Province of Quebec, and seeds of which were sent to the Experimental Farm, Ottawa, and to the Botanic Garden at Montreal.

In 1887 he went alone over the same ground, to verify his previous work; visiting in addition, Norway, Sweden and Denmark. Other trips were made in the interests of horticulture to the North-West, British Columbia, California, etc., and in July, 1899, he left for another trip around the world, taking in especially Japan, China, India, and other countries.

Freighted with much valuable information, he was on his way home when his death occurred on the 8th of March following, in Egypt. He contracted la grippe at Aden, which developed into double pneumonia. His remains were interred in the British Protestant Cemetery at Cairo, on the 10th, the funeral being attended by several friends. It was in accordance with his extreme modesty, by which he was especially characterized in life, that he made the request that his funeral would be conducted in a plain unostentatious manner.

Mr. Gibb's mind was very receptive, his opportunities great, and his memory retentive, so that he was generally looked upon as a bureau of information, which he was always glad to impart, and in consequence his correspondence was very heavy. Since it was so fully in accord with the experimental work in which he had already been engaged at Abbotsford, it is not surprising that he was one of the first and most active workers in the establishment of the Central Experimental Farm, in connection with Prof. Saunders.

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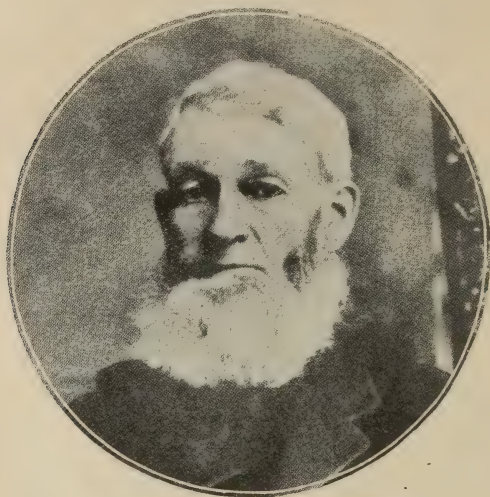
### JOHN CROIL.

For thirteen years director of our Association for Division No. 1, and most faithful in his attendance and duties, Mr. John Croil deserves a place on our historical records.

He was a native of Glasgow, Scotland, where he was born in the year 1824. He received a good classical education at the Grange Academy, Sunderland, England, and at the age of nineteen came to Montreal, where for four years he engaged in mercantile life; but finding the close confinement unfavorable to his health, he decided upon a country life, and purchased a farm in Osnabruck, situated on the banks of the St. Lawrence, and



built himself a home which he appropriately named "Sunnyside." Here he planted six acres of an orchard, largely of the Fameuse, which became noted as one of the finest in the section, and this, with his garden, gradually engrossed his attention, until of late years. His chief delight was in the pursuit of horticulture. He was a director of our Association from the year 1877 to the year 1890, during which time he has worked faithfully in the



JOHN CROIL.

interest of our department of industry. His frequent and spicy contributions to our journal and to our reports are a proof of this statement. Only a short time before his decease, he agreed to give a paper at our Summer Meeting on the "Use of Artificial Fertilizers in the Garden;" but on the 26th of June his work in his terrestrial garden ceased, and he was called to take his place among the flowers and fruits of the Celestial garden.

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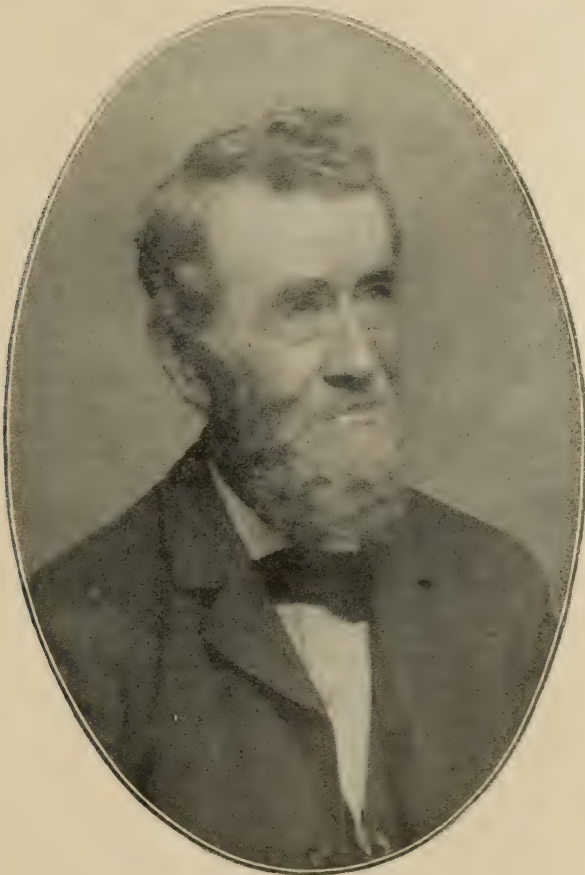
#### CHARLES EDWARD WOOLVERTON.

One of the eighteen constituent members of our Association, present at the organization in the City of Hamilton, was Mr. Charles E. Woolverton, of Grimsby, Ont. He was born at Grimsby, Ontario, in August, 1820. His father Dennis Woolverton, who farmed about four hundred acres of land, was at one time M.P.P., for the County of Lincoln, and well known as one of the early settlers in the Niagara District. On this farm there was an apple orchard in 1798. When Jonathan Woolverton, Charles' grandfather purchased it, it was of natural stock, and was top grafted about 1828 by an English gardener. I have often heard my father speak of him as "Old Peasley," and that he was a Quaker, and wore a big leathern apron, in the pockets of which he carried his scions.

Among my grandfather's papers, I have found a record of the varieties in his own handwriting, and they were as follows:—

Early French Russet.  
Early Harvest (from Queenston).  
Rhode Island Yellow Sweet.  
Col. Howard's September Sweet.  
Pumpkin Sweet.  
Pie apple.  
Sweet Bellybound.  
Large Greening.  
Ribston (from England).  
Rhode Island Greening.

Snow.  
Spitzenberg.  
Swayzie Pomme Grise.  
Orange Pippin.  
Farmers' Long Keeping.  
Newton Pippin.  
Blue Pearmain.  
Crook's Large Sweet.  
Holland Pippin.  
Large Pippin.



C. E. WOOLVERSON.

Some of these trees are still standing on the old farm, which I have the honor to occupy. One of them, a Greening, now occupies an area of nearly 40 square feet, and in one favorable season, I remember my father, Charles, picking twenty barrels of beautiful apples. He always used a grain bag for apple-picking, tied at the corners, and hung over the shoulder.



From a boy, therefore, Charles was made familiar with the occupations of the farm and the orchard. Often, in his boyhood days, before there was any G. T. R. or C. P. R., he was sent to Hamilton market, a distance of some sixteen miles with wagonloads of peaches or apples, but there was no such thing as an export of fruit, and Hamilton market was frequently glutted.

Charles was given a liberal education at Madison University, in New York State, but his two brothers having taken to the medical profession, he was induced to come home and be the farmer.

About the year 1857, he entered into the nursery business at Grimsby with A.M. Smith, under the title of Woolverton & Smith, and for about fifteen years a large local business was done in all kinds of fruit trees; after which the partnership was dissolved, and the business came into the hands of his son, Linus.

In those early years, Charles was a regular attendant upon the meetings of our Association, held at Hamilton. Of the names of men associated with him, at that time, some idea can be gained from the following extract from one of his magazine articles:—

“When our Association met at St. Catharines we were twice surprised; first at the knowledge of Judge Campbell and Delos Beadle about fruit, climate and soil; and second, at our own ignorance of the fruit we had been handling for a term of years. The genesis of our Association budded in St. Catharines. Judge Campbell was the first life member, but he did not live to see it bloom. Delos Beadle was the Moses of our exodus, leading us out of ignorance into our present fruit bearing stage. The formal organization of our Association elected W. H. Mills, of Hamilton, as President. He was not one of the mills of which it takes ten to make one cent, nor was he a wind-mill to crack corn, but he honored the goddess Pomona, by cultivating fruit and flowers, and at one of our meetings he took us out to see how he raised the finest plums and pears by the sweat of his brow.” In this article he refers also to Arnold, Holton, Haskins, Burnet, Saunders, Logie and others. He passed away in September, 1900, at the age of eighty, after an honored and useful life.

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# APPENDIX "B."

## CONSTITUTION AND BY-LAWS.

### REVISED CONSTITUTION AND BY-LAWS OF THE FRUIT GROWERS' ASSOCIATION OF ONTARIO.

#### PREAMBLE.

The objects of the Fruit Growers' Association of Ontario shall be the advancement of the science and art of horticulture in all its branches.

- (a) By holding an Annual Convention for the consideration of questions relating thereto.
- (b) By co-operating in every possible way with district and local fruit growers' associations and horticultural societies hereinafter mentioned.
- (c) By collecting, arranging and disseminating useful information.
- (d) By co-operating with the Ontario Department of Agriculture in all matters pertaining to the advancement of horticulture.
- (e) By holding an annual exhibition of fruit and other horticultural products and awarding premiums in connection with the same.
- (f) And by such other means as may from time to time seem desirable.

#### NAME.

1. This Association shall be called the Fruit Growers' Association of Ontario, and hereafter in this Constitution shall be referred to as the Ontario Association.

#### MEMBERSHIP.

2. Any person interested in horticulture may become a member by payment of one dollar per annum in advance to the general secretary, or by paying the necessary fee to the secretary of any district or local association in affiliation with the Ontario Association. A single payment of \$10.00 to the general secretary shall constitute a member for life.

3. Members of the Ontario Association in good standing shall be entitled to receive regularly the official organ of the Association, a copy of the Annual Report, such other literature as may be sent out by the Association from time to time and any other privileges that may be provided or arranged for by the Association.

4. The Association financial year shall end on the 31st of December.

#### ANNUAL MEETING.

5. The Annual Meeting shall be held at such time and place as may be designated by the Ontario Association.

#### OFFICERS.

6. A President, Vice President, Secretary-Treasurer and Directors only shall be the duly qualified officers of the Ontario Association.

7. The Directors shall be elected by ballot at the morning session of the last day of the Annual Meeting, and shall be thirteen in number, representing the thirteen Agricultural Divisions as set forth in Schedule A of this Constitution. The newly elected Board of Directors shall not take office till the second Tuesday in January of the year following, when the report of the retiring Executive and the Treasurer shall be received. Those four Directors who have occupied positions on the Board of Directors for the longest period shall not be eligible for re-election. These Directors shall, however, be eligible for re-election at the end of one year.

8. The newly elected Directors shall at their first meeting appoint from among their number a President and a Vice-President, and also from among themselves or otherwise, a Secretary-Treasurer.



9. The President, Vice President, Secretary-Treasurer and two other members appointed by the Directors shall constitute the Executive Committee of the Ontario Association.

#### DUTIES OF OFFICERS.

10. It shall be the duty of the President to preside at all meetings of the Ontario Association, decide all questions of order, and make any suggestions he may deem necessary in the interests of the Association. He shall be, *ex-officio*, a member of all committees appointed.

11. In the absence of the President, the powers and duties of his office shall devolve upon the Vice President.

12. It shall be the duty of the Secretary-Treasurer to attend all meetings of the Ontario Association, the officers and the Executive, and keep correct minutes of the same; conduct all correspondence and issue all press and other reports; prepare the report of the Executive Committee for the Annual Meeting; forward the list of representatives to the Secretaries of Fair Associations, also prepare for publication the Annual Report. As Treasurer, he shall receive and account for all moneys belonging to the Association, pay such bills and accounts as have been approved by the Executive. He shall have the power of Managing Director acting under the control and with the approval of the Executive.

13. By virtue of his office he shall be a member of each committee appointed.

14. Before entering upon the duties of his office, he shall enter into a bond, with security when required, which shall be approved of by the Directors.

15. The accounts of the Ontario Association shall be audited by an expert auditor or accountant appointed by the Executive Committee, and approved by the Minister of Agriculture for Ontario.

16. At each Annual Meeting, the retiring executive officers shall present a full report of their proceedings to the Ontario Association. A detailed statement of the receipts and expenditures for the previous year, and of assets and liabilities, a list of members and such information on matters of special interest to this Association as the officers may have been able to obtain, shall be sent to the Minister of Agriculture for Ontario within forty days after the holding of such Annual Meeting.

17. The Executive Committee shall carry into effect the plan of work decided upon by the officers, and shall arrange the details of the same.

18. The officers, or the members of the Executive, or of any Committee may conduct by correspondence, the duties assigned to said officers, Executive or Committee, by the Constitution and By-laws, or by the Association, when such a course is deemed advisable by said officers, Executive or Committee.

19. In case a vacancy occurs in the officers or directorate, the Executive Committee may fill said vacancy forthwith.

#### COMMITTEES.

20. The Association may appoint such committees from time to time as may be deemed expedient, and the first person named thereon shall be declared chairman of each committee.

21.—(a) The actual and reasonable expenses of officers and members of committees when attending meetings in the interests of the Association shall be defrayed out of the funds of the Association.

(b) The railway fare only of the Directors in attending the Annual Meeting shall be paid by the Ontario Association.

#### NOTICE OF MEETING.

22.—(a) At least two weeks' notice shall be given of each annual and general meeting, naming time and place of meeting. Notice may be given through the public press and by circular letter mailed to each member

(b) An officers' meeting shall be called by mailing at least ten days before date of meeting to each officer, a notice of meeting as above provided.

(c) Similar notice shall be given to each member of the Executive before an Executive meeting is held.

(d) An Executive meeting may be held on shorter notice, provided each officer is otherwise notified and consents thereto.

### QUORUM.

23.—(a) Not less than ten members shall be a quorum to transact business for the Association; not less than five members shall be a quorum at an officers' meeting; and not less than three members shall be a quorum at an Executive meeting.

(b) Any member of the Directorate or Executive not present at a meeting, if he send his views in writing, shall be considered as present.

### AFFILIATED ASSOCIATIONS.

24. Fruit Growers in any section of Ontario may form a local Association when it has a membership of ten or over, upon the payment to the Treasurer of the Ontario Association of \$5.00 for the first twenty-five members or fraction thereof above nine, and twenty-five cents per member for every additional member, which payment shall entitle the members to all the privileges and advantages of membership in the Ontario Association.

25. It shall be the duty of the officers and directors of the Ontario Association to encourage the formation of such local Associations.

26. Fruit Growers who are members of two or more local Associations shall be accepted as members of the Ontario Association from that affiliated Association only which is the first to forward the membership fee to the Secretary-Treasurer of the Ontario Association.

27. Such affiliated Associations may appoint one delegate to the Annual Meeting of the Ontario Association for the first twenty-five members or fraction thereof, and an additional delegate for every twenty-five members or major portion thereof above the first twenty-five. The actual railway fare of said delegate in attending the Annual Meeting shall be paid by the Ontario Association.

### CHANGE OF CONSTITUTION.

28. This constitution and by-laws may be amended by a majority of members present at an Annual Meeting or a special meeting called for the purpose of considering the same, and of which two weeks' notice shall be given.

### SCHEDULE A.—AGRICULTURAL DIVISIONS.

1. Stormont, Dundas, Glengarry, Prescott and Cornwall.
2. Lanark North, Lanark South, Renfrew North, Renfrew South, Carleton, Russell and the City of Ottawa.
3. Frontenac, City of Kingston, Leeds and Grenville North, Leeds South, Grenville South and Brockville.
4. Hastings East, Hastings North, Hastings West, Addington, Lennox and Prince Edward.
5. Durham East, Durham West, Northumberland East, Northumberland West, Peterborough East, Peterborough West, Victoria North (including Haliburton), and Victoria South.
6. York East, York North, York West, Ontario North, Ontario South, Peel, Cardwell, and the City of Toronto.
7. Wellington Centre, Wellington South, Wellington West, Waterloo North, Waterloo South, Wentworth North, Wentworth South, Dufferin, Halton, and City of Hamilton.
8. Lincoln, Niagara, Welland, Haldimand and Monck.
9. Elgin East, Elgin West, Brant North, Brant South, Oxford North, Oxford South, Norfolk North and Norfolk South.
10. Huron East, Huron South, Huron West, Bruce North, Bruce South, Grey East, Grey North and Grey South.
11. Perth North, Perth South, Middlesex East, Middlesex North, Middlesex West and the City of London.
12. Essex North, Essex South, Kent East, Kent West, Lambton East and Lambton West.
13. Algoma East, Algoma West, Simcoe East, Simcoe South, Simcoe West, Muskoka, Parry Sound East, Parry Sound West, Nipissing East, Nipissing West and Manitoulin.



# APPENDIX "C."

## FRUIT PRIZE LIST AT ONTARIO HORTICULTURAL EXHIBITION, 1906.

### APPLES.

#### CLASS 1. EXPORT OR FOREIGN MARKET VARIETIES.

##### (a) Barrels ready for Shipment.

- Baldwin*: 1st, Chatham F. G. A.; 2nd, Oakville F. G. A.; 3rd, Norfolk F. G. A., Simcoe.  
*Ben Davis*: 1st, Harry Dempsey, Rednerville; 2nd, Chatham F. G. A.; 3rd, Norfolk F. G. A.  
*Golden Russet*: 1st, Robert Thompson, St. Catharines; 2nd, Norfolk F. G. A.; 3rd, Belleville F. G. A.  
*Greening*: 1st, Chatham F. G. A.; 2nd, J. B. Guthrie, Dixie.  
*King*: 1st, Norfolk F. G. A.; 2nd, Oakville Fruit Growers'; 3rd, Belleville F. G. A.  
*Spy*: 1st, Chatham F. G. A.; 2nd, Norfolk F. G. A.; 3rd, Harry Dempsey.  
*Stark*: 1st, Harry Dempsey.

##### (b) Standard Boxes ready for Shipment. (Fruit Unwrapped).

- Baldwin*: 1st, Chatham F. G. A.; 2nd, Norfolk F. G. A.; 3rd, J. B. Guthrie.  
*Fameuse*: 1st, J. B. Guthrie; 2nd, Norfolk F. G. A.; 3rd, Harry Dempsey.  
*Golden Russet*: 1st, J. B. Guthrie; 2nd, W. G. Watson, Dixie; 3rd, J. G. Brown.  
*Greening, (Rhode Island)*: 1st, Norfolk F. G. A.; 2nd, Chatham F. G. A.; 3rd, G. H. Carpenter, Fruitland.  
*King*: 1st, A. Riach, Bronte; 2nd, Bradford Bowlby, Port Dover; 3rd, Chatham F. G. A.  
*McIntosh*: 1st, Norfolk F. G. A.; 2nd, A. D. Harkness, Irenā; 3rd, B. T. Boies, Belleville.  
*Spy*: 1st, Chatham F. G. A.; 2nd, B. T. Boies; 3rd, Norfolk F. G. A.

##### (c) Standard Boxes ready for Shipment. (Fruit Wrapped).

- Fameuse*: 1st, Robert Thompson; 2nd, B. T. Boies; 3rd, W. H. Bunting, St. Catharines.  
*Gravenstein*: 1st, Chatham F. G. A.; 2nd, Robert Thompson; 3rd, Harry Dempsey.  
*King*: 1st, Biggs Fruit & Produce Co., Burlington; 2nd, B. T. Boies; 3rd, J. G. Brown.  
*McIntosh*: 1st, A. D. Harkness; 2nd, Frank Dempsey; 3rd, B. T. Boies.  
*Northern Spy*: 1st, Chatham F. G. A.; 2nd, B. T. Boies; 3rd, Norfolk F. G. A.  
*Wealthy*: 1st, B. T. Boies; 2nd, J. B. Guthrie; 3rd, A. D. Harkness.

#### CLASS 2. DOMESTIC OR HOME MARKET VARIETIES.

##### (a) Barrels ready for Shipment.

- Blenheim*: 1st, A. R. Davison, Danforth.  
*Ontario*: 1st, Harry Dempsey.  
*Tolman*: 1st, Belleville F. G. A.; 2nd, Norfolk F. G. A.  
*Roxbury Russet*: Norfolk F. G. A.; 2nd, Harry Dempsey; 3rd, J. B. Guthrie.  
*Barrel any other variety not named in Class 1*: 1st, Frank Dempsey; 2nd, Belleville F. G. A.; 3rd, Belleville F. G. A.

*(b) Standard Boxes ready for Shipment. (Fruit Unwrapped).*

*Blenheim*: 1st, J. G. Brown; 2nd, Albert Gilbert, Simcoe; 3rd, A. R. Davison.  
*Gravenstein*: 1st, Robert Thompson; 2nd, Frank Dempsey; 3rd, B. T. Boies.  
*Ontario*: 1st, J. B. Guthrie; 2nd, W. G. Watson; 3rd, Harry Dempsey.  
*Ribston*: 1st, J. B. Guthrie; 2nd, Frank Dempsey.  
*St. Lawrence*: 1st, W. G. Watson, Dixie; 2nd, B. T. Boies.  
*Any other desirable variety not named in Class 1*: 1st, B. T. Boies; 2nd, Ainsley Yeager, Simcoe; 3rd, C. L. Stephens, Orillia.

## CLASS 3. DESSERT VARIETIES, PLATES OF 5.

*Fameuse*: 1st, J. B. Guthrie; 2nd, W. G. Watson; 3rd, Norman Brown, Eglinton.  
*Golden Russet*: 1st, Newcastle F. G. A.; 2nd, W. G. Watson; 3rd, Henry Pickett, Clarkson.  
*King*: 1st, W. G. Watson; 2nd, B. Bowlby, Port Dover; 3rd, J. B. Guthrie.  
*McIntosh*: 1st, S. N. Culver, Simcoe; 2nd, F. G. Stewart, Homer; 3rd, H. Dempsey.  
*Wealthy*: 1st, H. G. Watson; 2nd, Frank Dempsey, Albury; 3rd, Nelson Forest, Vittoria.  
*Spy*: 1st, W. G. Watson; 2nd, J. B. Guthrie; 3rd, Norman Brown.  
*Spitzenburg*: 1st, Forest F. G. A.; 2nd, Robert C. Fowler, Burlington; 3rd, W. J. Trinder, Simcoe.  
*Any Other Variety*: 1st, A. M. Smith, Pt. Dalhousie; 2nd, C. L. Stevens; 3rd, W. G. Watson.  
*Seedling. (Any desirable variety)*: 1st, W. G. Watson; 2nd, F. G. Stewart; 3rd, Frank Dempsey.

## CLASS 4. COOKING APPLES, PLATES OF 5.

*Alexandria*: 1st, Norman Brown; 2nd, J. G. Brown; 3rd, J. B. Guthrie.  
*Baldwin*: 1st, H. Pickett; 2nd, R. C. Fowler; 3rd, W. G. Watson.  
*Blenheim*: 1st, W. G. Watson; 2nd, A. R. Davison; 3rd, J. G. Brown.  
*Cayuga*: 1st, B. Bowlby; 2nd, J. C. Wyckoff; 3rd, W. H. Bunting.  
*Greening*: 1st, F. G. Stewart; 2nd, B. Bowlby; 3rd, J. H. Smith.  
*King*: 1st, S. H. Matheson; 2nd, H. Pickett; 3rd, J. B. Guthrie.  
*Ribston*: 1st, Norman Brown; 2nd, R. C. Fowler; 3rd, H. Pickett.  
*Spy*: 1st, W. G. Watson; 2nd, Norfolk F. G. A.; 3rd, Harry Dempsey.  
*Any Other Variety*: 1st, C. L. Stevens; 2nd, Newcastle F. G. A.; 3rd, Newcastle, F. G. A.

## CLASS 5. PYRAMIDS OF FRUIT.

*Pyramids with a Circular Base of 17 inch diameter, or Barrel Hoop size.*

*Ben Davis*: 1st, W. G. Watson; 2nd, Chatham F. G. A.; 3rd, Newcastle F. G. A.  
*Baldwin*: 1st, J. B. Guthrie; 2nd, W. G. Watson; 3rd, Newcastle F. G. A.  
*Blenheim*: 1st, W. G. Watson; 2nd, J. G. Brown.  
*Gravenstein*: 1st, Chatham F. G. A.  
*Fallawater*: 1st, A. R. Davison; 2nd, J. B. Guthrie, 3rd, Chatham F. G. A.  
*Fameuse*: 1st, J. B. Guthrie, 2nd, W. G. Watson; 3rd, Walter Forrester, Rugby.  
*King*: 1st, W. G. Watson; 2nd, J. B. Guthrie; 3rd, J. G. Brown.  
*McIntosh*: 1st, A. D. Harkness, Irena.  
*Ontario*: 1st, W. G. Watson; 2nd, J. B. Guthrie.  
*Spy*: 1st, W. G. Watson; 2nd, William Rickard; 3rd, J. B. Guthrie.  
*Wolf River*: 1st, G. C. Caston; 2nd, Walter Forrester.

## PEARS.

## CLASS 6. PLATES OF 5.

*Anjou*: 1st, Robert Thompson; 2nd, F. G. Stewart.  
*Bosc*: 1st, A. M. Smith; 2nd, Robert Thompson.  
*Clairgeau*: 1st, S. Baker, Simcoe; 2nd, Robert Thompson.  
*Diel*: 1st, Robert Thompson; 2nd, A. M. Smith.  
*Duchess*: 1st, W. F. Fisher, Burlington; 2nd, Chatham F. G. A.  
*Hardy*: 1st, F. G. Stewart; 2nd, Robert Thompson.  
*Howell*: 1st, A. M. Smith; 2nd, Thomas Delworth, Weston.



*Kieffer*: 1st, Robert Thompson; 2nd, W. H. Bunting.  
*Lawrence*: 1st, A. W. Peart, Burlington; 2nd, Robert Thompson.  
*Winter Nelis*: 1st, Robert Thompson; 2nd, F. G. Stewart.  
*Any Other Variety*: 1st, John Force, Simcoe; 2nd, A. M. Smith.

#### CLASS 7. EXPORT VARIETIES.

*Boxes ready for Shipment. (Fruit Wrapped).*

*Anjou*: 1st, G. A. Robertson; 2nd, Biggs Fruit and Produce Co.; 3rd, Robert Thompson.  
*Bosc*: 1st, F. G. Stewart; 2nd, G. A. Robertson; 3rd, Robert Thompson.  
*Clairgeau*: 1st, Robert Thompson; 2nd, G. A. Robertson; 3rd, F. G. Stewart.  
*Duchess*: 1st, Biggs Fruit and Produce Co.; 2nd, G. A. Robertson; 3rd, Robert Thompson.  
*Winter Nelis*: 1st, F. G. Stewart; 2nd, Robert Thompson; 3rd, G. A. Robertson.  
*Kieffer*: 1st, G. A. Robertson; 2nd, Biggs Fruit and Produce Co.; 3rd, Robert Thompson.  
*Lawrence*: 1st, B. T. Boies; 2nd, G. A. Robertson; 3rd, Robert Thompson.  
*Any Other Variety*: 1st, G. A. Robertson; 2nd, Robert Thompson; 3rd, F. G. Stewart.

#### GRAPES.

#### CLASS 8. PLATES AND PACKAGES.

*Agawam*: 1st, F. G. Stewart; 2nd, J. H. Smith, St. Catharines; 3rd, G. A. Robertson.  
*Concord*: 1st, F. G. Stewart; 2nd, G. A. Robertson; 3rd, Robert Thompson.  
*Lindley*: 1st, J. H. Smith; 2nd, Robert Thompson; 3rd, G. A. Robertson.  
*Niagara*: 1st, F. G. Stewart; 2nd, G. A. Robertson; 3rd, W. H. Bunting.  
*Vergennes*: 1st, G. A. Robertson; 2nd, F. G. Stewart; 3rd, Robert Thompson.  
*Wilder*: 1st, Robert Thompson; 2nd, G. A. Robertson; 3rd, J. H. Smith.  
*Any other variety*: 1st, J. H. Smith; 2nd, F. G. Stewart; 3rd, W. M. Robson, Lindsay.  
*Black Grapes, best 9 pound basket*: 1st, G. A. Robertson; 2nd, Robert Thompson; 3rd, F. G. Stewart.  
*Red Grapes, best 9 pound basket*: 1st, G. A. Robertson; 2nd, F. G. Stewart; 3rd, Robert Thompson.  
*White Grapes, best 9 pound basket*: 1st, F. G. Stewart; 2nd, Robert Thompson; 3rd, G. A. Robertson.  
*Black Grapes, best fancy package*: 1st, Robert Thompson; 2nd, G. A. Robertson; 3rd, F. G. Stewart.  
*Red Grapes, best fancy package*: 1st, Robert Thompson; 2nd, G. A. Robertson; 3rd, W. H. Bunting.  
*White Grapes, best fancy package*: 1st, G. A. Robertson; 2nd, Robert Thompson; 3rd, W. H. Bunting.

#### CLASS 9. DISPLAY OF FRUIT IN COMMERCIAL PACKAGES, EXHIBITED BY AN AGRICULTURAL OR HORTICULTURAL SOCIETY, OR FRUIT GROWERS' ASSOCIATION.

1st, St. Catharines Cold Storage and Fruit Growers' Association; 2nd, Norfolk Agricultural Society; 3rd, Grantham Agricultural Society.

*For the best display of Fruit not in Commercial packages, exhibited by an Agricultural or Horticultural Society, or Fruit Growers' Association.*

1st, St. Catharines Cold Storage and Fruit Growers' Association; 2nd, Norfolk Agricultural Society; 3rd, Grantham Agricultural Society; 4th, Orillia Horticultural Society.

#### PRESERVED FRUIT.

#### CLASS 10. QUART SEALER OF CANNED FRUIT.

*Blackberries*: 1st, Mrs. W. H. French, Oshawa; 2nd, John Downham, Strathroy; 3rd, Mrs. T. Delworth.  
*Cherries, Black or Red*: 1st, Mrs. R. Thompson, St. Catharines; 2nd, Mrs. F. G. Stewart, Homer; 3rd, John Downham.

- Cherries, White:* 1st, Mount Pleasant Women's Institute; 2nd, Mrs. R. Thompson; 3rd, Mrs. F. G. Stewart.
- Gooseberries:* 1st, Mrs. W. H. French.
- Grapes, Black or Red:* 1st, Mrs. R. Thompson; 2nd Mrs. T. Delworth; 3rd, Miss Lizzie Tasker, St. Catharines.
- Grapes, White:* 1st, Mrs. F. G. Stewart; 2nd, Mrs. R. Thompson; 3rd, Mrs. T. Delworth.
- Peaches, White:* 1st, Mrs. R. Thompson; 2nd, Mrs. F. G. Stewart; 3rd, Mrs. T. Delworth.
- Peaches, Yellow:* 1st, Mrs. T. Delworth; 2nd, Miss Lizzie Tasker; 3rd Mrs. F. G. Stewart.
- Pears:* 1st, John Downham; 2nd, Mt. Pleasant Women's Institute; 3rd, Mrs. F. G. Stewart.
- Plums, Blue or Red:* 1st, Mrs. T. Delworth; 2nd, Mrs. R. Thompson; 3rd, Mrs. F. G. Stewart.
- Plums, Green or White:* 1st, Mrs. W. H. French; 2nd, Mrs. R. Thompson; 3rd, Mrs. F. G. Stewart.
- Raspberries, Red:* 1st, John Downham; 2nd, Mrs. W. H. Bunting; 3rd, Miss Carrie S. Rush, Humber Bay.
- Raspberries, Black:* 1st, Mrs. W. H. French; 2nd, Mrs. F. G. Stewart; 3rd, Mrs. R. Thompson.
- Strawberries:* 1st, Mt. Pleasant Women's Institute; 2nd, Miss Lizzie Tasker; 3rd, John Downham.

## CLASS 11. PINT JAR OF JAM.

- Currant, Black:* 1st, Mrs. R. Thompson; 2nd, Mrs. F. G. Stewart; 3rd, Miss Carrie S. Rush.
- Grape:* 1st, Mrs. R. Thompson; 2nd, Miss Helen McKay, Doncaster; 3rd, Miss Lizzie Tasker.
- Peach:* 1st, Miss Carrie S. Rush; 2nd, Mrs. T. Delworth; 3rd, Mrs. R. Thompson.
- Pear:* 1st, Mrs. R. Thompson; 2nd, Mrs. F. G. Stewart; 3rd, Mrs. T. Delworth.
- Plum:* 1st, Mrs. R. Thompson; 2nd, Mrs. F. G. Stewart; 3rd, Mrs. T. Delworth.
- Raspberry:* 1st, Miss Carrie S. Rush; 2nd, Mrs. T. Delworth; 3rd, Mrs. R. Thompson.

## CLASS 12. PINT OF JELLY.

- Apple:* 1st, Miss Charlotte E. Shaw, Oakville; 2nd, Mrs. J. W. Sparling, Bowmanville; 3rd, W. H. Stevenson, Oshawa.
- Crab Apple:* 1st, Mrs. T. Delworth; 2nd, Mrs. A. M. Smith; 3rd, Mrs. J. W. Sparling.
- Red Currant:* 1st, Mrs. J. W. Sparling; 2nd, Miss Carrie S. Rush; 3rd, Norman Brown.
- Grape:* 1st, Mrs. J. W. Sparling; 2nd, Mrs. R. Thompson; 3rd, Mrs. F. G. Stewart.
- Quince:* 1st, Miss Lizzie Tasker; 2nd, Mrs. W. H. Bunting; 3rd, Miss Charlotte E. Shaw.
- Red Raspberry:* 1st, Mrs. P. W. Hodgetts; 2nd, Mrs. J. W. Sparling; 3rd, Mrs. R. Thompson.
- Strawberry:* 1st, Mrs. T. Delworth; 2nd, Mrs. R. Thompson; 3rd, Mrs. F. G. Stewart.

## CLASS 13. GRAPE JUICE.

- 1st, Miss A. L. Martin, Toronto; 2nd, Miss Lizzie Tasker; 3rd, Mrs. F. G. Stewart.

## CLASS 14. KING EDWARD HOTEL SPECIAL PRIZE.

- 4 Jars of Fruit: 1st, Mrs. Lewis Vair, Barrie.

## COUNTY PRIZE LIST.

## BRANT.

- Baldwin:* 2nd, J. W. Clark, Cainsville.
- Blenheim:* 1st, J. W. Clark.
- Golden Russet:* 2nd, J. W. Clark.
- Greening:* 1st, J. W. Clark.
- Mann:* 1st, J. W. Clark.
- Spy:* 2nd, J. W. Clark.



## BRUCE.

*Baldwin*: 1st, W. A. Rowand, Walkerton.  
*Blenheim*: 1st, W. A. Rowand.  
*Fameuse*: 1st, W. A. Rowand.  
*Golden Russet*: 1st, M. G. Dippel, Walkerton; 2nd, W. A. Rowand.  
*Greening*: 1st, M. G. Dippel; 2nd, W. A. Rowand.  
*Mann*: 1st, W. A. Rowand.  
*Spy*: 1st, M. G. Dippel; 2nd, W. A. Rowand.

## GREY.

*Baldwin*: 1st, J. I. Graham, Vandeleur; 2nd, A. Gifford, Meaford.  
*Ben Davis*: 1st, A. Gifford; 2nd, J. I. Graham.  
*Canada Red*: 1st, J. I. Graham.  
*Golden Russet*: 1st, J. I. Graham; 2nd, D. Harrow, Vandeleur.  
*Gravenstein*: 1st, J. I. Graham.  
*Greening*: 1st, J. I. Graham.  
*King*: 1st, J. I. Graham.  
*Spy*: 1st, A. Gifford; 2nd, J. I. Graham.

## HALTON.

*Baldwin*: 1st, A. Riach, Bronte; 2nd, G. S. Peart, Burlington.  
*Cranberry*: 1st, G. S. Peart; 2nd, A. Riach.  
*Golden Russet*: 1st, A. Riach; 2nd, G. S. Peart.  
*Greening*: 1st, G. S. Peart.  
*King*: 1st, A. Riach.  
*Mann*: 2nd, G. S. Peart.  
*Spy*: 1st, A. Riach; 2nd, G. S. Peart.  
*Ribston*: 1st, G. S. Peart.  
*Roxbury Russet*: 1st, A. Riach; 2nd, G. S. Peart.

## HASTINGS.

*Baldwin*: 1st, John Aris, Belleville; 2nd, John Graham, Wallbridge.  
*Ben Davis*: 1st, John Graham; 2nd, John Aris.  
*Fameuse*: 1st, John Aris.  
*Golden Russet*: 1st, John Graham; 2nd, John Aris.  
*Greening*: 1st, John Aris; 2nd, John Graham.  
*King*: 1st, John Graham; 2nd, John Aris.  
*Spy*: 1st, John Graham; 2nd, John Aris.  
*Stark*: 1st, John Graham; 2nd, John Aris.  
*Wealthy*: 2nd, John Aris.  
*Any Other Variety*: 1st, John Aris; 2nd, John Graham.

## KENT.

*Baldwin*: 1st, Mrs. A. Dolsen, Chatham; 2nd, J. Johnston, Chatham.  
*Gravenstein*: 1st, C. McPherson, Cedar Springs; 2nd, J. E. Hambly, Cedar Springs.  
*Greening*: 1st J. Johnston; 2nd, C. J. Ross.  
*King*: 1st, C. J. Ross.  
*Spy*: 1st, H. McCully, Mull; 2nd, J. E. Hambly.  
*Stark*: 1st, J. E. Hambly.  
*Wealthy*: 1st, G. W. Boley.

## LAMBTON.

*Baldwin*: 1st, Forest F. G. A.; 2nd, Arkona F. G. A.  
*Ben Davis*: 1st, Arkona F. G. A.; 2nd, Forest F. G. A.  
*Canada Red*: 1st, W. A. Broughton.  
*Fallawater*: 1st, W. A. Broughton; 2nd, Forest F. G. A.  
*Golden Russet*: 1st, Forest F. G. A.  
*Greening*: 1st, Forest F. G. A.; 2nd, Arkona F. G. A.  
*Hubbardston*: 1st, Forest F. G. A.; 2nd, W. A. Broughton.  
*King*: 1st, Forest F. G. A.; 2nd, Arkona F. G. A.  
*Spy*: 1st, Forest F. G. A.; 2nd, Arkona F. G. A.

## LEEDS AND GRENVILLE.

*Baxter*: 1st, J. H. Warner; 2nd, Harold Jones, Maitland.  
*Canada Red*: 1st, William Beddie, Prescott; 2nd, W. E. Skinner, Prescott.  
*Fameuse*: 1st, William Beddie; 2nd, J. H. Warner.  
*Golden Russet*: 1st, J. H. Warner; 2nd, Ed. Keller, Maitland.  
*McIntosh*: 1st, J. H. Warner; 2nd, Ed. Keller.  
*Scarlet Pippin*: 1st, Ed. Keller; 2nd, J. H. Warner.  
*Scott Winter*: 1st, J. H. Warner; 2nd, Ed. Keller.  
*Wealthy*: 1st, William Beddie; 2nd, Ed. Keller.  
*Any Other Variety*: 1st, J. H. Warner.

## LINCOLN.

*Baldwin*: 1st, F. G. Stewart, Homer; 2nd, W. S. Thompson, St. Catharines.  
*Blenheim*: 1st, W. S. Thompson; 2nd, F. G. Stewart.  
*Duchess*: 1st, W. S. Thompson; 2nd, F. G. Stewart.  
*Fameuse*: 1st, F. G. Stewart; 2nd, W. S. Thompson.  
*Golden Russet*: 1st, C. M. Honsberger, Jordan Station; 2nd, W. S. Thompson.  
*Greening*: 1st, C. M. Honsberger, Jordan Station; 2nd, W. S. Thompson.  
*King*: 1st, W. S. Thompson; 2nd, F. G. Stewart.  
*Spy*: 1st, W. S. Thompson; 2nd, C. M. Honsberger.  
*Ribston*: 2nd, C. M. Honsberger.

## NORFOLK.

*Baldwin*: 1st, Norfolk F. G. A.; 2nd, Albert Gilbert, Simcoe.  
*Blenheim*: 1st, Norfolk F. G. A.; 2nd, Charles Trinder.  
*Fameuse*: 1st, Norfolk F. G. A.; 2nd, Ed. Matthews.  
*Golden Russet*: 1st, Norfolk F. G. A.; 2nd, J. S. Wyckoff.  
*Greening*: 1st, Norfolk F. G. A.; 2nd, B. Bowlby, Port Dover.  
*King*: 1st, Norfolk F. G. A.; 2nd, B. Bowlby.  
*Spy*: 1st, Norfolk F. G. A.; 2nd, Charles Trinder.  
*Spitzenburg*: 1st, Norfolk F. G. A.; 2nd, W. J. Trinder.  
*Yellow Bellflower*: 1st, B. Bowlby; 2nd, D. Wintermate.  
*Any Other Variety*: 1st and 2nd, Norfolk F. G. A.

## NORTHUMBERLAND AND DURHAM.

*Alexander*: 1st, D. J. Gibson, Newcastle.  
*Baldwin*: 1st, Frank H. Hall; 2nd, Newcastle F. G. A.  
*Ben Davis*: 1st, P. C. Dempsey; 2nd, D. J. Gibson.  
*Fameuse*: 1st, Ed. Hanna, Janetsville; 2nd, D. J. Gibson.  
*Golden Russet*: 1st, P. C. Dempsey; 2nd, F. H. Hall, Wicklow.  
*Greening*: 1st, D. J. Gibson; 2nd, P. C. Dempsey.  
*King*: 1st, Newcastle F. G. A.; 2nd, P. C. Dempsey.  
*McIntosh*: 1st, E. C. Beman, Newcastle.  
*Spy*: 1st, William Rickard, Newcastle; 2nd, P. C. Dempsey.  
*Wealthy*: 1st, E. C. Beman; 2nd, P. C. Dempsey.

## ONTARIO.

*Baldwin*: 1st, R. W. Grierson, Oshawa; 2nd, Enos Remmer, Pickering.  
*Ben Davis*: 1st, Walter McGregor, Whitby; 2nd, W. H. Stevenson, Oshawa.  
*Fameuse*: 1st, W. H. Stevenson, Oshawa.  
*Golden Russet*: 1st, W. H. French, Oshawa; 2nd, W. H. Stevenson.  
*Gravenstein*: 2nd, Gervais Cornell, Pickering.  
*Greening*: 1st, W. H. Stevenson; 2nd, Enos Remmer.  
*King*: 1st, W. H. Stevenson; 2nd, Gervais Cornell.  
*Spy*: 1st, R. W. Grierson; 2nd, W. H. French.  
*Any Other Variety*: 1st, W. H. Stevenson; 2nd, Walter McGregor.

## OXFORD.

*Baldwin*: 1st, J. C. Harris, Ingersoll; 2nd, E. M. Hersee, Eastwood.  
*Ben Davis*: 1st, J. C. Harris.  
*Fameuse*: 1st, E. Hersee; 2nd, J. C. Harris.  
*Golden Russet*: 1st, E. Hersee; 2nd, William Newton, Woodstock.  
*Greening*: 1st, R. W. Newton; 2nd, Andrew McKay, Woodstock.  
*King*: 1st, R. W. Newton; 2nd, M. G. Schell, Woodstock.  
*Spy*: 1st, J. C. Fullick, Woodstock; 2nd, J. C. Harris.



*Seek*: 1st, J. C. Harris; 2nd, Andrew McKay.

*Tolman*: 1st, J. C. Harris; 2nd, M. G. Schell.

#### PERTH.

*Baldwin*: 1st, J. O. Coles, Munro.

*Blenheim*: 1st, J. O. Coles.

*Ben Davis*: 1st, J. O. Coles.

*Cranberry*: 1st, J. O. Coles.

*Golden Russet*: 1st, J. O. Coles.

*Greening*: 1st, J. O. Coles.

*King*: 1st, J. O. Coles.

*Spy*: 1st, J. O. Coles.

*Seek*: 1st, J. O. Coles.

*Any Other Variety*: 1st, J. O. Coles.

#### PRINCE EDWARD.

*Baldwin*: 1st, Harry Dempsey, Rednerville; 2nd, Frank Dempsey.

*Cranberry*: 1st, Harry Dempsey; 2nd, Frank Dempsey.

*Fameuse*: 1st, Frank Dempsey; 2nd, Harry Dempsey.

*Gano*: 1st, Frank Dempsey; 2nd, Harry Dempsey.

*Golden Russet*: 1st, Harry Dempsey; 2nd, Frank Dempsey.

*King*: 1st, Frank Dempsey; 2nd, Harry Dempsey.

*McIntosh*: 1st, Frank Dempsey; 2nd, Harry Dempsey.

*Spy*: 1st, Harry Dempsey; 2nd, Frank Dempsey.

*Stark*: 1st, Frank Dempsey; 2nd, Harry Dempsey.

*Wealthy*: 1st, Harry Dempsey; 2nd, Frank Dempsey.

#### EAST SIMCOE.

*Alexander*: 1st, W. Forrester, Rugby; 2nd, D. Cotton, Orillia.

*Baxter*: 1st, C. L. Stephens, Orillia.

*Fameuse*: 1st, C. L. Stevens, Orillia; 2nd, Walter Forrester, Rugby.

*McIntosh*: 1st, C. L. Stevens; 2nd, G. Hewett, Ardrea.

*Golden Russet*: 1st, C. L. Stevens; 2nd, R. H. Jupp.

*King*: 2nd, C. L. Stevens.

*Spy*: 2nd, C. L. Stevens.

*Any Other Variety*: 1st and 2nd, C. L. Stevens.

#### STORMONT, DUNDAS AND GLENGARRY.

*Alexander*: 1st, Andrew Harkness, M. D., Lancaster.

*Baxter*: 1st, Andrew Harkness, M. D.; 2nd, A. D. Harkness, Irena.

*Fameuse*: 1st, A. D. Harkness; 2nd, J. D. Campbell.

*McIntosh*: 1st, Nicholas Everetts, Iroquois; 2nd, A. D. Harkness.

*Northwest Greening*: 1st, Andrew Harkness, M. D.

*Scott Winter*: 1st, A. D. Harkness; 2nd, J. D. Campbell.

*Wealthy*: 1st, J. D. Campbell; 2nd, A. D. Harkness.

*Wolf River*: 2nd, J. D. Campbell.

*Any Other Variety*: 1st and 2nd, A. D. Harkness.

#### VICTORIA.

*Alexander*: 1st, W. M. Robson, Lindsay; 2nd, Thomas Beall, Lindsay.

*Fameuse*: 1st, Thomas Beall; 2nd, W. M. Robson.

*Golden Russet*: 1st, Thomas Beall; 2nd, W. M. Robson.

*McIntosh*: 1st, W. M. Robson.

*Spy*: 1st, Thomas Beall; 2nd, W. M. Robson.

*Wealthy*: 1st, W. M. Robson.

*Yellow Bellflower*: 1st, Thomas Beall; 2nd, W. M. Robson.

#### YORK.

*Alexander*: 1st, J. G. Brown.

*Blenheim*: 1st, S. H. Matheson; 2nd, J. G. Brown.

*Fameuse*: 1st Charles Plunkett, Woodbridge; 2nd, M. W. Robertson, Kettleby.

*Golden Russet*: 1st, Charles Plunkett; 2nd, J. G. Brown.

*Greening*: 1st, J. G. Brown; 2nd, A. R. Davison.

*King*: 1st, M. W. Robertson; 2nd, S. H. Matheson.

*McIntosh*: 1st, M. W. Robertson; 2nd, A. R. Davison.

*Spy*: 1st, A. R. Davison; 2nd, J. G. Brown.

*St. Lawrence*: 1st, Charles Plunkett.

# APPENDIX "D"

## SAN JOSE SCALE.

### OUTLINE OF WORK PERFORMED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, 1897-1907.

BY W. B. VARLEY.

The existence in the Niagara District of the San Jose Scale was first brought to the attention of the Department early in 1897 through the Ontario Fruit Growers' Association. Mr. W. M. Orr, who was in charge of the experiments in spraying for the Department at the time, was directed to ascertain the extent of the infestation. A bulletin was prepared by the Professor of Biology, at the Ontario Agricultural College, describing the insect, and the methods of treatment by whale-oil soap wash, kerosene emulsion, resin washes, etc. (See p. 11, O. A. C. Report, 1897). Mr. Orr in his report (file 8840), dated October 28, 1897, stated "I have located fruit trees from infested nurseries in New Jersey at 85 points in the Province extending from Ottawa to Chatham and Leamington." Inspector Orr was thereupon instructed by the Minister to follow up this nursery stock and destroy it "on the spot," if scale were found to be present; the object being to "entirely stamp out the pest if possible." In November of the same year Mr. Orr reported that he had found scale in six orchards in Essex county; that "thousands of trees were infested and that many would have to be burned." In his reply, the Minister referred to the fact that American authorities were advocating spraying treatment and he expressed the fear, based on the difficulty that existed in inducing farmers to spray for other pests, that if treatment were resorted to it would, in the end, result in the infestation spreading wider and wider year by year.

At the Session of the Legislature, 1898, an Act was passed entitled "An Act to Prevent the Spread of the San Jose Scale." This Act provided that all plants found to be infested with San Jose Scale should be cut down and destroyed by burning, and that compensation, not exceeding one-fourth of the value of the plant destroyed (not including fruit), should be paid.

At about this time a deputation from the Ontario Fruit Growers' Association waited upon the Minister of Agriculture at Ottawa, and as a result of their representations, provision was made for the thorough fumigation under Government inspection of all imported nursery stock, and its entry was restricted to certain points on the boundary of the Province. A very vigorous policy was then entered upon; a large inspection staff was organized with G. E. Fisher, of Freeman, as Chief Inspector, and an effort made to locate all infested orchards in the Niagara District, and in Essex and Kent, and destroy infested trees. In the year 1898, \$12,911.86 was expended on the work of inspection, \$6,231.00 for compensation, and \$146.00 for printing bulletins, etc., a total of \$19,290.00. The inspection work was confined to trees that had been planted for five years or less in the counties of Halton, Wentworth, Welland, Lincoln, Essex, Kent and Elgin. This work developed the fact that the scale had been present in the Province for at least seven years. It was also discovered that during the previous spring stock from infested Ontario nurseries had been sent to nearly every county in the Province and planted.



Under the Minister's instructions, the Inspector procured a list of the sales, and as a result stock from these nurseries was located at 100 different points in the Province, and the trees destroyed. The Inspector was then instructed to make a thorough examination of nurseries, and seven of them were found to be infested. The infested stock was destroyed.

While this work was progressing, deputations from Niagara and Essex waited upon the Minister, protesting against the destruction of trees. In the west, the greatest antagonism was aroused. In some instances attempts were made by force to prevent inspectors gaining admission. Public opinion finally compelled the Department to desist from the work of destruction, and as a result the scale again made rapid headway.

During this time the nurseries were inspected by three of the professors of the Ontario Agricultural College, and the work of fumigating the stock with hydrocyanic acid gas was inaugurated.

During 1899, \$15,786.00 was spent on inspection of orchards; \$10,603.00 in compensating owners; including everything, the total cost of the work that year being \$27,770.50.

Owing to the protests made by owners of orchards, and to the fact that the scale was much more widespread, and much longer established than was supposed at the inception of the work, and that it existed in Ontario nurseries the Minister concluded to appoint a commission to discuss matters with the growers. Dr. Mills of the O. A. C., John Dearness, of London, and W. H. Bunting, of St. Catharines, conducted the enquiry. Their report recommended that opportunity should be given growers to treat their trees in place of destruction by burning. Accordingly in the spring of 1900, an amendment was passed to the San Jose Scale Act, (63 Vic., c. 46, s. 2):—

(1) Permitting the adoption of regulations for the treatment of infested plants by spraying;

(2) Prohibiting the removal of nursery stock from a nursery unless the same had been fumigated.

From then on the compulsory destruction of trees was discontinued, and the work took the form of investigating remedies, apparatus for spraying, identifying the scale for growers, instructing them in the preparation and application of the mixtures recommended, superintending the fumigation of nursery stock, supplying growers with spraying materials at one-half cost. These materials consisted chiefly of whale-oil soap and crude petroleum. The results of the experiments were published, and efforts were made by the Department to arouse growers to the seriousness of the infestation, and as to necessity for prompt measures to keep the scale in check. Great indifference was at first encountered, but in the Niagara District this gradually gave way to a due appreciation of the situation.

During the year 1900, \$7,112 was expended on the San Jose Scale work. This included an extra allowance made to certain growers in Kent County, whose trees had been destroyed, and who were greatly dissatisfied at the amount they had previously received.

At the Fruit Growers' meeting in the autumn of 1900, Professor Loch-head said as follows:—"The Government should pass a measure which would compel the owners of orchards either to spray their trees or to pay for the spraying of the trees when done by the Government."

In 1901, the work, as outlined in 1900, was continued, the sum of \$4,250 being expended.

In the autumn of 1901 the Fruit Growers' Association passed a resolution, (Report of the O. F. G. A., 1901, p. 25), which led to the following amendments being made to the Act at the session of 1902:—

(1) That a municipality might appoint local inspectors to enforce 'he provisions of the Act, and that upon the petition of fifteen or more ratepayers they were compelled to appoint said inspector, the Department paying one-half the remuneration of said inspector.

(2) Requiring owners of orchards to effectually treat their trees with the remedies set forth in the Act, or prescribed by the Department, or else to destroy same by fire, subject to the penalties prescribed by the Act.

The effect of this amendment was to place the onus of inspection on the municipalities interested, the work to be performed under the general direction of the Department through the Chief Inspector.

In 1902, the work already indicated was continued at an expenditure of \$7,237 for the year, including \$375 additional compensation to certain growers in Kent.

At the Fruit Growers' Convention in the autumn of 1902, the Chief Scale Inspector recommended the use of the lime-sulphur wash, with which he had previously conducted experiments for two years, as being cheaper, safer and more effective than any other remedy. Articles and bulletins explaining this remedy were published and distributed by the Department, practical demonstrations were continued, and sulphur was added to the list of spraying materials supplied at a reduced cost.

In the autumn of 1903, Professor Lochhead made the following statement at the Entomological Convention:—"Never before has the San Jose Scale problem seemed so easy of solution as it is to-day. After long experimentation we now know that we have methods which are both effective and easy to apply. The whole solution of the difficulty lies now with the fruit grower himself." (p. 42, Entomological Society Report, 1903.)

In 1903, \$3,712 was expended in the work. The Department at this time agreed to supply spraying materials at wholesale rate, and to pay the freight thereon, instead of at half cost.

In 1904, the amount expended was \$4,281.

The orchard inspection staff was now discontinued, it being left in the hands of the municipalities to carry on the work. Inspector Fisher retired, and his Assistant, J. Fred Smith, of Glanford, took his place, being employed casually by the Department as occasion required.

In April, 1905, Inspector Smith was instructed to visit the County of Kent and report on the conditions prevailing. He reported that the infested area comprised the whole of the township of Harwich, the southwestern half of the township of Howard, and that it was spreading westward to the township of Raleigh. It was in the township of Harwich that seven original areas of infestation were located in 1899, and from these the scale had since spread. During the intervening six years, he stated that it had spread on an average a distance of three miles. He further reported that the feeling of the owners continued to be for the most part one of indifference, as it had been from the first, the people stating that for the past five or six years at any rate, the apple crop had not been worth the picking. The fruit being of no value it was impossible to make the people feel any interest in their orchards. This feeling was accentuated because of the fact that so many were making money out of beans, corn, wheat and pork. He stated that along what was known as the "ridge," however, there were some very fine orchards and the people were selling lots of fruit. Likewise in the Chatham section a co-operative fruit association had been organized with



upwards of twenty farmers as members. This company had purchased a power sprayer, and was spraying the orchards of the members.

He further stated that the prevailing view was that the Department should purchase a number of power machines, put them in charge of spraying gangs, and spray all orchards, charging the owners pro rata for the work.

With the conclusion of the spraying season of 1905, the distribution of spraying materials at cost was discontinued.

In May, 1905, the inspector was instructed to inspect orchards in the vicinity of St. Thomas, Courtwright and Sparta, in Elgin County. These were original points of infestation. In a hurried inspection he failed to find scale outside of the original orchards, but in them he found plenty of scale. He endeavored to induce the owners to treat.

In May, 1906, H. P. Jeffrey, of Blytheswood, the local inspector for the township of Mersea, in the County of Essex, reported the existence of scale in some 19 orchards at Leamington and Blytheswood, but that he had not been over half the fruit district. He stated that the owners were disposed to treat their orchards, and had already made a beginning in that direction. Inspector Jeffrey called attention to the fact that some of the farms on which scale was found were untenanted. The chief inspector was sent into the district, and Mr. Jeffrey afterwards wrote the Department that he (the Chief Inspector), had been of great help in stirring up the farmers to take action.

In October, 1906, a new infestation was reported in the vicinity of Tillsonburg, in Oxford County, near the borders of Elgin and Norfolk. The Inspector was sent and found one orchard badly infested, and 7 others slightly infested. He reported that the people expressed a willingness to try to save their orchards.

In January, 1907, on account of several requests for assistance having been sent to the Department, a series of meetings was arranged in East Kent, to secure information on the situation, and if possible to devise a means of coping with it. The delegation consisted of Chief Inspector Smith, and Joseph Tweddle of Fruitland. They held meetings at Ridgetown, Guilds, Blenheim, Kent Bridge, Eberts and Chatham. They informed the people that the Department was prepared to place a spraying outfit in the district, and spray at a cost to growers of 10c. per tree, if such a course met with approval. At four of the six meetings no resolution was passed asking for any assistance. At Guilds, a resolution was passed in opposition to the Department doing anything; and at Blenheim, the same feeling was freely expressed. On the other hand, at Ridgetown and Chatham, resolutions were passed asking for assistance. The Ridgetown resolution asked for a power sprayer to operate at a nominal cost to growers. The Chatham resolution asked the Government to appropriate a sum to investigate parasitic enemies of the scale and codling moth, and to conduct experiments with the various proprietary remedies offered to the public for the treatment of scale, with a view to securing an efficient, cheap and easily applied remedy.

As to the state of the orchards, the commissioners reported that the orchards at Ridgetown, Blenheim and Guilds were largely past redemption, and that owners there did not seem to think it worth while for the Government to do anything in the matter. At Chatham, Kent Bridge and Eberts, conditions were different, and the people seemed disposed to treat their trees or have the Government do so for them on the basis mentioned, as in those sections there had been no serious loss of trees. At Kent Bridge a co-operative association was formed at the meeting.

In the Township of Mersea, in the County of Kent, four inspectors have this year been appointed to deal with the situation.

The foregoing will give a general idea of the conditions prevailing in the scale areas of the western district at the present time.

In the Niagara District, owing to the efforts of the Department, and the importance of the interest at stake, growers have been thoroughly aroused to the importance of fighting the scale. They are now doing so pretty generally, and have been for some time past.

In 1906, the scale was reported near Effingham, in the township of Pelham, and the Inspector was sent to report on the situation. He found scale at several points in the neighborhood. The Minister urged the municipal authorities to appoint a local Inspector to carry out the provisions of the Act, which they afterwards did. The adjoining township of Thorold also appointed an Inspector shortly afterwards.

It will be observed from the foregoing that the conditions prevailing in the County of Kent are peculiar to the district, that is to say, the farmers are not for the most part making any money out of their fruit, and therefore are indifferent. The question arises what should the Department do under these special circumstances to cope with the situation.

The facts are these:—

1. The majority of the growers will not treat their trees.

2. Many of the trees cannot now be saved by treatment; others are too large to be properly treated. On the other hand there are areas where the trees are less infested where they can be saved by prompt treatment, and where the owners are anxious for the Department to help them.

3. That if systematic action is taken, the spread of the pest may be stopped, both there and at Tillsonburg and St. Thomas, and thousands of trees saved that are not yet infested beyond redemption.

The suggestion is made that the Department should operate a number of power sprayers in the district, and treat all trees at a nominal cost. This would entail a large outlay to operate, materials, etc. The spraying season is short and more than one outfit would be needed to cover the ground. The work must be efficiently done, and the Department finds great difficulty in securing the services of men who are competent to perform it. Then the question arises, how are men who do not want their trees treated, and who will pay nothing for treatment, to be dealt with? Their trees should be sprayed in the common interest; so should the infested trees on untenanted farms, or they will remain a source of infestation for treated orchards.

If this work is once undertaken, it will have to be continued from year to year, as treatment does not eradicate the pest, at least not unless followed up thoroughly for a number of seasons.

Having undertaken the work in the west, the Department would have to be prepared, as Inspector Smith points out, to conduct similar operations throughout the Niagara District, which would mean going into the business on a very large scale. It would probably call for the employment of a Superintendent who would take exclusive charge of the whole matter, thoroughly organize the work, and follow it up systematically from year to year.

The matter of the introduction of parasites for scale and codling moth has not been touched upon, but it may be stated briefly, that investigations undertaken in the United States at great expense conclusively show that no assistance is to be looked for in this direction at the present stage in combatting these pests.



So far as the investigation of new remedies is concerned, the Department has made and will continue to make experiments with them. To this end the Department keeps in touch with developments in the United States, and with the experiments that are being conducted there.

The part that the local co-operative Associations are playing in combatting the codling moth, the San Jose Scale and other insects destructive to fruit and fruit trees, should not be overlooked in this connection. These Associations are being organized throughout the Province, at the instigation of the Department through the medium of the Ontario Fruit Growers' Association, with which they are affiliated. They have for their object the co-operation of their members in the packing and marketing of their fruit. Twenty-eight have been organized up to the present. In some instances, notably at Chatham and Newcastle, the Associations have power spraying outfits, and charge the members with the work done. Other Associations make spraying by their members, one of the rules of membership. Owing to the fact that these Associations are making the business of fruit growing much more profitable, no difficulty is experienced in getting the spraying done by their members. It is felt that the extension of these Associations and the results they are demonstrating as to the value of spraying will do more to arouse the public to spray than any demonstrations conducted by the Department, and more than any compulsory law on the Statute book could possibly accomplish.

The following municipalities have appointed Township Scale Inspectors :

	No.		No.
Saltfleet (Wentworth) .....	2	Thorold (Welland) .....	1
North Grimsby (Lincoln).....	3	Clinton (Lincoln) .....	2
Louth (Lincoln) .....	1	Barton (Wentworth) .....	1
Pelham (Welland) .....	1	Mersea (Essex) .....	4

TORONTO, March 11th, 1907.

# APPENDIX "E"

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## A BRIEF STUDY OF THE PEACH INDUSTRY.

By ALDEN BLAIR CUTTING, B.S.A., "CANADIAN HORTICULTURIST," TORONTO.

The purpose of this article is to offer for the consideration of growers and all persons interested in the peach industry, some ideas gained by personal experience, observation, and investigation in different peach districts of Canada and the United States. During the summer of 1903, the writer made a brief study of the peach industry of the State of Georgia. Many of the ideas set forth in the following pages are based upon the result of that study. Particular and frequent reference is made to methods practised in the great Hale orchards, of Fort Valley, Ga., where an up-to-date intensive system, on an extensive plan, is carried out. The results of investigations in other peach sections also are noted when fitting and opportune. An outline of the writer's experiments in winter spraying at Guelph will be found in its place, as well as some work on soil analysis. The leading writers on peach culture have been occasionally consulted and drawn upon to verify and complete the chronicle of our own somewhat limited observations and experience. The knowledge gleaned from these various sources has been applied, in the preparation of this article, to the condition of things in Ontario.

It has not been our purpose, however, to attempt a full and exhaustive treatise on the subject. To solve the thousand and one little and great problems that attend the culture of the peach, would be the work of a lifetime and probably a work in vain. Volumes could be written on each particular phase of the industry. In a comparatively short article, and one that is intended to cover briefly the whole subject, only the fundamental principles can be considered. For these reasons, we hope that the reader will pardon our sins of abbreviation and omission, and we trust that he may find something of interest as well as profit in what the following pages may tell.

I beg to acknowledge most gratefully the very valuable assistance that has been furnished me in the preparation of this article. I desire particularly to thank Mr. J. H. Hale, of South Glastonbury, Conn., Mr. J. H. Baird, Superintendent Hale-Georgia Orchard Co., Fort Valley, Ga., and his late assistant Mr. J. S. Seeley, for the many kind privileges afforded me when in Georgia, and for imparting to me a wealth of practical information. I am deeply indebted, also, to Mr. G. Harold Powell, Pomologist in charge of Fruit Storage Investigations, Washington, D.C., for valuable information and for the use of prints from which figures 2, 3, 4, 9, 10, 11, and 12 were taken. My thanks are due Prof. H. L. Hutt, Horticulturist at O.A.C., for figures 1, 5, 6, 7, 8, 15, 16, 17 and 18; and Prof. J. B. Reynolds, O.A.C., Guelph, for material assistance and for the use of apparatus required for making soil analyses. The bulletins of the North Carolina State Board of Agriculture dealing with some of the by-products of the industry, and one or two other up-to-date articles, were looked into to fill an



occasional gap in this article and to round off the corners. I wish also to thank those who have sent me samples of soils for analysis, and finally to tender my appreciation and acknowledgment of any favors received from sources that are not here specified.

## THE HISTORY AND EXTENT OF PEACH CULTURE.

The peach is probably indigenous to China, and is supposed to have been introduced into Europe by way of Persia, from whence it takes its name. The date of its introduction into Europe is not definitely known. Historians tell us that it was grown and valued by the Romans in the first century. From Italy, it was carried into England about the 16th century by way of France.

Near the end of the 17th century the peach was introduced into America by the early settlers. Although a native of a foreign country, it is here that its greatest perfection has been attained. Undoubtedly, the United States is the greatest peach growing country in the world, and Georgia is the greatest peach state in the Union, being closely followed by Michigan. The States of California, Ohio, New York, Pennsylvania, Maryland, Delaware, and New Jersey also grow peaches more or less extensively. In Virginia, the mother state of peach culture, the industry is now almost abandoned. If the signs of the times fail not, it is safe to predict that the banner peach state of the future will be Texas, where to-day thousands upon thousands of acres are being planted.

In the northern states and Canada, peach regions are determined by the evenness and mildness of the climate in winter. The chief areas lie near the great lakes which have an ameliorating effect upon the climate. Near the sea coast the winds are usually too strong. In Canada, the chief peach-growing districts are found in the Niagara peninsula of Ontario, and in the counties bordering along Lake Erie.

Mr. W. W. Hilborn, of Leamington, states that peach culture in the Essex peninsula assumed large proportions prior to the freeze-out of 1899. Several thousand acres were planted to that fruit. Most of the orchards were well taken care of, hence were in fine condition, and the outlook was very promising. Long continued cold without any snow on the ground during the months of January and February of 1899 killed the trees by root-freezing. The tops were comparatively uninjured. After the freeze-out of 1899, quite a large acreage was replanted only to meet the same fate during the winter of 1904. Many of the growers are trying again, but are not going into it on so large a scale. Various methods of root protection will now be used, mostly cover crops with the addition perhaps of some coarse material spread around the base of the trees, such as straw, tomato vines, potato tops, etc., and a little earth thrown on top. At a meeting of the Board of Control of the Ontario Fruit Experiment Stations, held in January, 1907, it was decided to conduct experiments in budding peach trees upon hardy plum roots. It is hoped that such a practice will help to mitigate the disastrous effects of root freezing.

The Georgian Bay district can grow some varieties successfully, but cannot be considered a safe commercial locality. The factors detrimental to success are (according to Mr. J. G. Mitchell, of Clarksburg): First, distance from market; second, lateness of spring and shortness of season; and third, uncertainty of crop, due to various causes, such as late spring frosts, danger of severe freezing in winter, tenderness of fruit buds, etc.

Mr. W. H. Bunting, of St. Catharines, writes with regard to the peach industry in that district: "While the peach is to some extent a speculative crop and one on which any prospective grower would not be wise to depend exclusively, there is no fruit which is more attractive both from an æsthetic and financial standpoint. In the hands of a careful grower, three or four crops out of five can safely be counted upon in the Niagara district, and this has been greatly exceeded at times under favorable circumstances."

"The principal difficulties in the way of successful peach growing may be stated as follows: (1) *Insect pests*. The peach borer, which annually destroys many thousands of trees; the San Jose scale, which in a very short time will spread over an entire orchard and unless held in check will speedily consign the orchard to the brush pile. (2) *Fungous diseases*. The peach leaf curl, which infests some varieties, notably the Triumph and Elberta more so than many others; peach yellows, a most obscure and fatal disease, and one for which up to the present, notwithstanding the closest investigation, no remedy has been discovered; a disease known as "Little Peach" the above, climatic conditions sometimes result in the loss of the crop through severe winter temperature or late spring frosts.

"The peach industry in Canada has passed through a number of phases during the past twenty-five years, and has run the gauntlet of several severe tests during that time. These have, however, only served to demonstrate the fact that the Niagara District is well adapted to the successful cultivation of this luscious fruit under proper handling and management. An ever increasing market is opening up, and no doubt in the near future larger areas than ever will be devoted to the cultivation of this fruit."

Peaches may also be grown with more or less success in the provinces of Nova Scotia and British Columbia.

As far as the writer can learn, the first peaches for market in Canada were grown at Grimsby, Ontario, about the year 1820 by Mr. Dennis Wolverton, M.P.P. They were mostly natural fruit and were taken to Hamilton market. In 1856, Mr. C. E. Wolverton, who was one of the first and constituent members of the Ontario Fruit Growers' Association, planted five acres of a commercial peach orchard at "Maplehurst," Grimsby, consisting of such varieties as Early Purple, Early Barnard, Mountain Rose, Royal George, Early Crawford, Late Crawford, Morris White, Old Mixon, etc. He was, I understand, the first grower to attempt shipping peaches by express to the different Canadian markets. Within recent years rapid and progressive strides have been made and to-day the peach industry of Ontario is an important factor in the agricultural economies of the Province.

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## BOTANY AND CLASSIFICATION.

At one time the peach was thought to be derived from the almond, but now it is considered as an original species from China. Its botanical name has frequently been changed. Formerly it was known as *Amygdalus Persica*, also as *Persica vulgaris*, but now it is placed in a genus *Prunus* and given the specific name of *Prunus Persica*. *Prunus* is a genus of the order *Rosaceæ*. Some authorities go further and divide the species into two well marked types, the clingstones or pavies (*P. Persica vulgaris* of Risso), and the freestones (*P.P. domestica* of Risso).

There are five distinct races of peaches in North America. These were first recognized by Onderdonk, of the U. S. Department of Agriculture, and



by Price, of the Texas Experiment Station. The classification of Onderdonk, which separated the peach into five groups—the Persian, the Northern Chinese, the Southern Chinese, the Spanish, and the Peen-To—has since been adopted, with modifications, by G. Harold Powell, Bailey and others. Mr. Powell (Delaware Bull. 54) substituted in place of the name “Northern Chinese Race” the name “Chinese Cling Group,” which is, as he advocates, in the interest of a more exact and practical nomenclature. A sixth group, the Oriental Bloods, has been mentioned commercially by the nurserymen of the South. A brief description of these different classes or groups is as follows:

(1) The *Persian* includes a large number of varieties most commonly grown in the north, as Crawford, Old Mixon, Salway, etc.

(2) The *Chinese Cling* is mainly characterized by broad-headed, spreading trees with very large flat leaves and large, mostly free or semi-cling fruit, represented by the Chinese Cling, Elberta, Carman, Greensboro, Smock, etc. This group is cultivated in most of the peach regions of the country, but is particularly adapted to the “Cotton Belt” of the South with Northern Florida as the southern boundary of its adaptability.

(3) The *Spanish* or Indian is supposed to have been originated in Florida and the Gulf Coast country as a variation from seed of foreign extraction. It is adapted to the latitude of North Florida. The fruit of this class is very late, firm, and often streaked, and is represented by such varieties as Cabler, Columbia, Galveston, Lulu, Texas, and Victoria.

(4) The *Southern Chinese* or Honey produces oval, long pointed fruits with a deep suture near the base, and includes the parent variety Honey, Climax, Oviedo, Taber, and others; the range of adaptability being from Middle Florida to Middle Georgia and west to the Mexican border.

(5) The *Peen-to* includes the parent Peen-to, which is a flat or tomato-shaped peach, and such varieties as the Angel, Suber, Waldo, and Jewel; cultivated largely in Southern Florida and semi-tropical latitudes.

(6) The *Oriental Bloods* are suited only to Southern latitudes, and comprise varieties with blood-red flesh, such as Red Ceylon and the Japan Dwarf Blood.

## NURSERY MANAGEMENT AND PROPAGATION.

*Selection and Treatment of the Seed.* Before we can raise good peaches, we must raise the trees, and before we can raise good trees we must know how to select and treat the seed. Many growers prefer seed from natural fruit rather than from cultivated varieties, claiming that such is more vigorous and hardy and that the trees are longer lived. While this contention has considerable weight and no mistake is apt to be made by its adoption, yet, there are men who use only the seed from budded trees and with the same degree of success.

Whether selected from natural or cultivated fruits, care should be taken to secure pits that are healthy, of good size, and from ripe fruits. It is better also to obtain the seed from trees of known hardiness and strong growth. Preference is sometimes given to those from yellow peaches, particularly when the seedlings are to be budded with the same colored fruit. Pits from distilleries, or canneries where boiled, are not fit for the nursery as the boiling process destroys their vitality. When it is desired to grow the peach on heavier or moister soil than suits its own roots, the seed of the plum may be used for stocks. In those countries adapted to its growth, the hard-shell sweet almond is used as a stock in very dry soils.

To get an even stand of trees the pits should be stratified in the fall (i.e., mixed with alternating layers of sand in a box, or buried in a fairly dry spot in the garden or orchard) and exposed to freezing and thawing till spring. Or the pits may be kept till near spring, then soaked in water till the shells are well swollen with moisture. They should then be placed in thin layers on the surface of the ground and exposed to the action of frost, being protected from drying by a light covering of leaves or straw. In some sections of the country the seed may be sown in fall or winter directly in the nursery, but by so doing, only a portion will grow and no regularity can be attained in the rows. It is better to treat the seed by stratification, as that will prevent vacancies. In the spring, when taken up, most of the shells will be found to be cracked open; and others may be loosened with a hammer. They are then ready for planting in the nursery.

*Choosing the Site.* The most important requisite in choosing the site for a peach nursery is the selection of a suitable soil. Peach pits will grow in a more or less questionable shape on a variety of soils, but to get the best results, one should select a very light, sandy loam, well-drained, warm, and easy of cultivation. The proper exposure and location should also be considered. The sweep of prevailing winds should be avoided and, in this country, the slope of the land, if any, should be towards the north to retard bud growth in spring and where near large bodies of water the slope should be towards the water. Select also a place that is easy of access, near the road for ease in transporting the trees, and near the house so that the development of the young seedlings and buds may be conveniently watched. A location convenient to a constant water supply is also desirable.

*Preparation of Ground.* The ground for the nursery should be in the form of a square or a parallelogram, and it should be laid out so as to admit of horse cultivation. Strips of land should be left on all sides sufficiently wide to allow a horse to turn about upon. To get the soil in the best condition for the growth of young seedlings, a hoed crop should occupy the land the previous season. A fall plowing is necessary, and ribbing for winter will aid in pulverizing the clods. Another plowing in the spring, and a subsequent harrowing and rolling to smooth the surface, will leave the land in good condition to receive the pits. If the land is not rich enough, apply manure that is well rotted, and on some soils unleached hardwood ashes at the rate of forty or fifty bushels per acre may also be useful.

*Planting the Seed.* Nursery rows should be about three and a half or four feet apart, and laid out as straight as possible. Mark out and plow furrows two or three inches deep, and drop the pits about six inches apart in the drills. With a hoe or rake cover the pits and firmly press the soil upon them. Care should be taken that the seeds do not become dry or mouldy before they are planted.

*Care of Nursery.* The ground should be cultivated as often as is required to keep the weeds down and the soil loose, especially during the early growth of the young seedlings. Hand-hoeing is necessary between the trees in the rows. Where the seed has been sown too thickly, through carelessness or accident, the superfluous trees should be removed. As the season advances, the cultivator should be used less frequently, and when the trees are large enough to shade the ground between the rows it should be stopped altogether.

*Budding.* In Ontario, peach seedlings are budded during August and the early part of September. Budding may be done at any time during the growing season, when the bark peels easily, but in the north late work is necessary to prevent the buds starting into growth that fall and subsequently



being winter-killed. Buds of the desired variety are taken from vigorous growing healthy shoots of the current season's growth. If selected from trees of known worth, as pointed out in the section below, so much the better, as then there is less danger from degeneration, purity being insured, and such a practice tends to breed up rather than down. The upper buds on the shoot are usually discarded, as are also those at the lower end. The remaining portion of the shoot is termed a "stick." The leaf blades on these "sticks" are removed, and the petioles are left to serve as a handle for the buds, which are located always in the axils of the leaves. When the "sticks" are thus prepared they should be placed, butts down, in a bucket of water and covered so as to keep them fresh, and they should be used as soon as possible.

Three persons are required in the nursery to do the work properly—the budder, who should be experienced and an expert, and two boys, one to go ahead and strip the trees of their leaves for six inches above the ground, and the other to follow and tie the bud to the stock. The budder takes a bud from the "stick" and inserts it in a T-shaped incision on the north side of the stock near the ground. The tyer follows and applies a ligature of string or raffia with moderate pressure to hold the bark firmly over the bud. In about two weeks the buds should be united to the stock and the bandage may be removed. The buds should remain dormant until the following spring. When growth begins, the wood above the bud should be removed. Care must be taken to label the rows in the nursery true to name of the variety being propagated.

In the Southern States, June budding is practised by which means a tree sufficiently large for transplanting to the orchard is produced in one season from the seed. In fall budding, it takes two years from the seed or one year from the time the buds start into growth before the tree is ready for transplanting.

*Care of Budded Trees.* Soon after the top of the stock has been cut off, all the natural buds and twigs below the scion should be removed. This should be repeated as often as new buds or twigs appear. All shoots that spring from the roots must also be watched and kept down. Cultivation of the ground should be resumed and continued throughout the growing season. Early in the season a little nitrate of soda may be applied if the growth of the tree is not satisfactory. Summer pruning is practised by many nurserymen and sometimes with advantage. It is not essential, however. Whether it is advisable or not is a matter of opinion. Under another heading we shall consider this question more fully.

*Improving Peach Trees by Selection.* An important factor in connection with the propagation of peaches and other fruit trees, and one that does not receive the attention it merits from fruit-growers and nurserymen, is the question of propagating from bearing trees, and only from trees of known worth. Sufficient attention is not given to the character of the buds and scions used for propagating purposes. This is said to be a reason why so many of the old-time varieties of fruits have "run-out," and why so many good varieties of the present day are degenerating and giving place to new ones.

Nurserymen almost invariably cut their buds and scions from young trees not yet in bearing. This practice develops a tendency in our fruit trees to run too much to wood at the expense of fruit. By following it, we cast aside the elementary principles of plant improvement; we fail to take advantage of a simple principle that was practised, though unconsciously, by the plant growers of a hundred years ago, viz., selection from the best.

Many of us fail to appreciate the fact that fruit buds tend to vary. We know that distinct new varieties have arisen by bud variation, but we are not sensible to the possibility of a lesser bud variation—a variation or departure from the type which, though, perhaps, small at first, may eventually change the entire character of the variety that we are propagating. This change may be for better or for worse. The usual tendency is to degenerate or revert to the wild or natural species from which the variety originated. How important, then, is the question of propagating from trees that have borne fruit—trees of whose productivity and worth we are well acquainted.

Wood for propagating purposes, whether for budding, grafting, or making cuttings, should be selected as carefully from trees and plants of the ideal type as if we were selecting seeds. The principle of variation is as great in fruit buds as in seeds, or even in live stock. By applying this principle, and applying it in the fruit nursery, we will tend to breed up rather than down.

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### HOW TO START AN ORCHARD.

*The Location.* The selection of a suitable site for a peach orchard is most important. Although a problem which involves numerous and various difficulties, it is deserving of due and careful consideration by all intending planters. Opinions among growers of experience differ widely in regard to the best location, the best site, the best slope and the best exposure for a plantation of peach trees. It is obvious, then, that no direct rules can be laid down. We shall, however, mention a few general principles to indicate the proper course to pursue.

In the first place, it is important to locate the orchard near a good market or within reach of good transportation facilities. If two or more means of shipping are within reach, they would make the situation all the more desirable. Also select a place where plenty of help can be secured when required to harvest and market the fruit.

Probably the chief requisite in choosing a location is a situation that is, as far as possible, immune from frosts. Narrow valleys and depressions of any kind are not desirable. These form receptacles in which the cold air collects, as cold air, being dense and heavier than normal or warm air, settles to lower levels. This drainage of the atmosphere occurs only on still nights and under the most favorable circumstances. Another important subject of inquiry in locating an orchard and one akin to the preceding is the proper elevation. As low depressions are unsafe and very high elevations colder than comparatively low ones, it is not always the absolute elevation, but rather the relative elevation, of the site that must be considered.

The adaptability of a region in Ontario for peach growing depends also upon its proximity to large bodies of water. In no part of the world, perhaps, is the ameliorating influence of large bodies of water more distinctly marked than in those counties fringing on the Great Lakes. The limit of the boundary of the area over which the effects of these lakes are felt to be of economic importance depends largely upon the degree of the slope away from the water. Lands that gradually slope away from the lake feel the advantage of its proximity much farther than those lands that rise abruptly.

The exposure or aspect of the land must also be considered when deciding upon the location. A northern exposure retards the swelling of the buds which often occurs during warm spells in spring. A southern exposure gives earlier results and better colored fruits. Near large bodies of water the best slope is towards the water. Planting on the lee side of hills and



forests is also an advantage. All these points and many others should be looked into before arriving at a definite conclusion.

Difference in climate and soil, as well as innumerable local conditions unthought of and consequently unprepared for, tend to increase the difficulties met with in choosing a suitable site. Therefore, we must study closely local environments, we must profit by the experience of others, and we must use sound, firm judgment if we are to ascertain, with any degree of success, the proper location and exposure for a peach orchard. As a general statement, it is quite safe to say that a relatively high elevation and a northern exposure increase the probability of immunity from frosts and, as a consequence, afford the best location for an orchard in this Province. With, in addition, the Great Lakes nearby and the possibility of artificial protection by means of wind-breaks, and by no means least, the probability of securing more hardy varieties through careful selection of seedlings and scions from northern grown fruits, there is no apparent reason why the peach growing area of Ontario cannot be appreciably enlarged.

*Wind-breaks.* The importance of wind-breaks, in their relation to horticulture, is being recognized more and more as the art of fruit growing



FIG. 1. Young peach orchard, owned by Mr. J. L. Hilborn, Leamington, Ont. Trees two years old, previous to freeze of 1904.

advances. While there are a few who directly oppose them, yet it is safe to say that the greatest difference of opinion exists in connection with minor details rather than with the main question of their importance as a whole. In this short article, we shall not attempt to discuss the value of wind-breaks, but shall devote the space to a few remarks upon their construction.

For interior regions, a wind-break that is dense and hedge-like—with trees closely planted—is the most desirable. For districts situated near large bodies of water, one less dense is to be preferred. The relative denseness of wind-breaks depends upon the kind of tree used, the number and distance apart of rows, and the number of trees in each row. When two or more rows are planted it is well to have the trees in one row occurring alternately with those in the next.

Almost any strong-growing tree will do to make the wind-break. For heavy wind-breaks and for winter protection the coarser evergreens are best. In Canada and the Northern States, the Norway spruce is the evergreen most frequently employed. Austria, Scotch, and native pines, have also proven quite satisfactory. For light wind-breaks, deciduous trees are used. Among the best of those for the purpose are maples, elms, and Lombardy poplar. In some districts, and in fact, as a rule, a wind-break consisting of both coniferous and deciduous trees is the most serviceable.

*The Soil.* Many horticulturists and orchardists say that the peach is partial to only one kind of soil; others claim that it is adapted to different kinds, but particular kinds; and others again think that it will thrive on a great variety of soils, from light sand to heavy clay. We read of peaches growing in Michigan on drifting sand dunes; in Florida, on light pine sands; in Arkansas, on thin chocolate sands; in New England, on stony land and poor gravel; in Delaware and New Jersey, on light sandy loams; in parts of Ontario, on sandy loams; in Texas, on heavy, black loams; in West Virginia, on black soils of limestone origin; in Kansas, on black prairie soils; in parts of New York, on clay loams; and in Georgia, on stiff red clays. These are some of the peach soils that we read and hear about, and sometimes see. They must not be taken, however, to indicate the representative peach soils of the places named, as probably some of them refer to special and isolated cases.

When in Georgia, I observed that the so-called and much-talked-of red clays of the Georgia "peach belt" were only clayey in appearance and texture when wet. In this observation we were not alone. Many men, better informed in the matter and better fitted to express an opinion, supported us, going as far as to say that these soils, the so-called red clays, are in reality red sands. To verify these impressions, two samples were secured and taken to the Ontario Agricultural College, Guelph, and personally analyzed by the writer. The one purpose of the analysis being, as intimated, to obtain a correct definition for the soil. This red clay, it should be noted, constitutes the subsoil. The surface soil—six or eight inches deep—is composed of light gray sand with an occasional cropping out of the red soil from beneath. Two samples of this gray surface soil were also secured for analysis.

The results of the analyses show that the red "clay" of both samples, is made up of 85 per cent. sand and silt, indicating that it is in reality a light sandy loam. The surface soils both proved to be mostly sand, one analyzing 97 per cent., and the other about 91 per cent. sand and silt. Probably the clayey nature of the red soil is due to the presence of iron oxide, which in sandy soils is known to act as a cementing material. Although the analyses of these samples from Georgia have no direct bearing on the selection of peach soils in Ontario, they indirectly influence our notions of these things in two ways: first, by confirming the general impression that peaches require soils of sandy character; and second, by pointing out the fact that popular definitions are often far from exact.

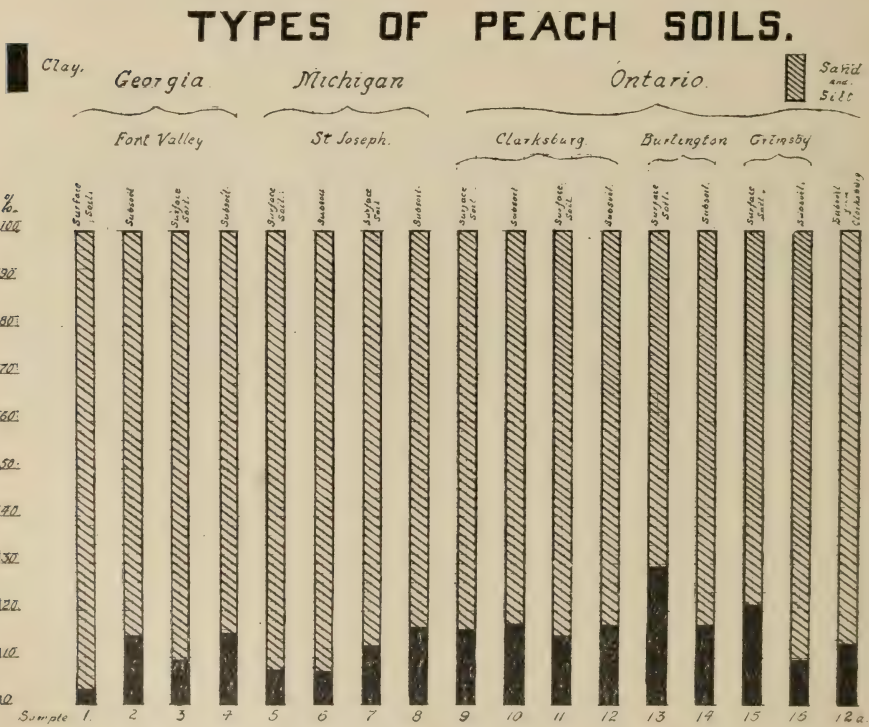
The information gained in these mechanical analyses, led us to continue the work. A number of samples of surface and subsoils were secured from various peach sections; four from Michigan, and a dozen or so from different places in Ontario. A mechanical analysis was made of each with the purpose, as before, of defining the sample and of comparing the results. A short account of the work done with results may be found in the following section of this article.

As a general statement, it may be said that the best peach soil is a deep sand. Upon such soils, there is less wood growth at the expense of fruit, and the wood matures earlier in the season. Next to sandy soils are the light loams. Heavier soils induce late wood growth. All peach soils must be light, warm, deep, and well-drained. Mr. S. H. Rumph, of Marshallville, Ga., said to the writer: "On the prospective site, dig a hole five feet deep, leave over night, and if water runs into it, move on to some other locality." This advice is well worth noting, as probably the most essential feature in a peach soil is dryness; not too dry,—it must be retentive of moisture,—but rather dry than moist.



*Mechanical Analyses of Soils.*—Peach soils are by popular custom often erroneously defined. We read of peaches growing on soil of all types and conditions. A few of these are mentioned earlier in this article. As stated there, we thought it of interest to secure a number of samples for analysis; four were got in Georgia, four in Michigan and nine in Ontario. Each sample was separated by a definite method into different sized particles and by determining the percentage of soil grains over one-thousandth of an inch in diameter, a correct definition was secured. The following table was used as the basis for defining the samples

90 to 100 per cent. greater than $\frac{1}{1000}$ of an inch.....	sand.
75 " 90 " " " " " .....	light sandy loam.
60 " 75 " " " " " .....	sandy loam.
40 " 60 " " " " " .....	loam.
25 " 40 " " " " " .....	clay loam.
10 " 25 " " " " " .....	clay.
0 " 10 " " " " " .....	heavy clay.



Diagrams of soils analyzed, showing relative percentages of sand and clay. Odd numbers represent surface soils, and even numbers, subsoils.

DESCRIPTION AND DEFINITION OF SAMPLES ANALYZED.

- No. 1. Surface soil from Fort Valley, Georgia, *Sandy soil*, containing 97.05 per cent. sand and silt. Brown. From virgin forest, adjoining orchard from which No. 3 was taken.
- No. 2. Subsoil from Fort Valley, Ga. *Light sandy loam*, containing 85.75 per cent. sand and silt. A very deep red. Very tenacious, evidently due to the presence of iron oxide. From orchard of young trees.

No. 3. Surface soil from Fort Valley, Ga. *Sandy soil*, 90.62 per cent. sand and silt. Light brown. From orchard of known worth recently in fruiting trees and now growing young trees of first class vigor and health. Built up by commercial fertilizers and cow peas.

No. 4. Subsoil from Fort Valley, Ga. *Light sandy loam*, 84.65 per cent. sand and silt. Red. Composed of large and small lumps, but under microscope separate structure predominates; lumps probably due to cementing property of iron oxide. Similar in most respects to No. 2, differing only in being lighter in color. From record breaking orchard of Elbertas.

No. 5. Surface soil from St. Joseph, Michigan. *Sandy soil*, 92.40 per cent. sand and silt. Brown, with slight tint of red. Incumbent upon subsoil No. 6. From orchard five years old, fertilized exclusively with barnyard manure.

No. 6. Subsoil from same place and orchard as No. 5. *Sandy soil*, 92.65 per cent. sand and silt. Light orange. Under microscope particles appear rounded, apparently coated with iron oxide.

No. 7. Surface soil from St. Joseph, Michigan. *Light sandy loam*, 87.55 per cent. sand and silt. Dark brown. Incumbent upon No. 8. From orchard twenty years old, fertilized exclusively with barnyard manure.

No. 8. Subsoil from same place and orchard as No. 7. *Light sandy loam*, 83.65 per cent. sand and silt. Dark gray, with faint tint of red. Particles rather coarse and showing presence of iron, but not so evenly rounded as those in No. 6.

No. 9. Subsoil from Clarksburg, Ontario. *Light sandy loam*, 84 per cent. sand and silt, rather fine in grain. Brown. Incumbent upon No. 10. From land thirty years in farm crops and five years in bearing peaches, fertilized by barnyard manure.

No. 10. Subsoil underneath No. 9. *Light sandy loam*, 82.5 per cent. sand and silt. Brown. Taken from four inches deep, too near the surface. Practically the same as No. 9.

No. 11. Surface soil from Clarksburg, Ontario. *Light sandy loam*, 85.5 per cent. sand and silt. Brown. Apparently same as No. 9. From land thirty-five years in farm crops, fertilized by barnyard manure.

No. 12. Subsoil underneath No. 11. *Light sandy loam*, 82.5 per cent. sand and silt. Same as Nos. 9, 10, and 11.

No. 13. Surface soil from Burlington, Ontario. *Sandy loam*. 70.85 per cent. sand and silt. Brown. Incumbent upon No. 14. From orchard twelve years old, fertilized with wood ashes.

No. 14. Subsoil underneath No. 13. *Light sandy loam*, 83.20 per cent. sand and silt. Reddish brown. Quite similar in appearance and texture to No. 13.

No. 15. Surface soil from Grimsby, Ontario. *Light sandy loam*, 78.5 per cent. sand and silt. Brown. Many coarse particles and probably some gravel. Typical peach soil of the section. Last fertilized five years ago with wood ashes.

No. 16. Subsoil underneath No. 15. *Sandy soil*, 90.5 per cent. sand and silt. Red brown. A more even soil than No. 15, and with finer particles.

*Extra:*

No. 12 (a). Subsoil from Clarksburg, Ontario. Selected from two feet deep on same farm as Nos. 9, 10, 11, and 12. *Light sandy loam*, 87 per cent. sand and silt. Brown.



*Selection of Varieties.* When starting an orchard, one must first choose the location and soil and then decide upon the varieties to be planted. To give advice upon this point is a difficult problem. Various factors must be taken into consideration. With some men, personal preference largely influences the success of the venture. Local conditions of soil and climate must be studied and varieties chosen that are best adapted to such conditions. Planters should have some purpose in view, some particular market to be filled and select accordingly. Inter-pollination should also be considered; while this is not so important in peaches as with some other kinds of fruits, yet it is safer never to plant an orchard of one variety alone. These are general pointers.

To be more explicit, select varieties with reference to adaptation, hardy and suited to your soil; to productiveness, not shy bearers; to health, as some varieties are more subject to some diseases than others; to vigor, and



FIG. 2. Ruddy-cheeked, golden Elbertas in picking basket and "cups."

save the plant doctor's bill; to season of ripening, late or early; and to early bearing and longevity,—worth considering, but not essential in the case of peaches. Among the qualities to be decided upon with reference to the fruit of the peach, we have appearance, size, color, freestone or clingstone, white or yellow flesh, flavor, texture, firmness, thickness of skin, and keeping qualities.

The number of varieties that one should plant will depend upon the markets to be supplied and the method of marketing. When catering to both local and distant markets, plant varieties to ripen early and late so as keep up a full supply of marketable fruit from the beginning to the end of the season. When large shipments in refrigerator cars are in prospect, select varieties that will ripen at or near the same time so as always to have sufficient fruit to fill the car, or better still, plant enough trees of one variety for a particular season, as varieties behave differently in cold storage. The fundamental principle in choosing varieties is to profit by the experi-

ence of our neighbors, to observe the behavior of varieties growing under conditions similar to your own, and to be governed accordingly.

The uncertainty of varietal names is a matter that requires particular attention. New varieties, or, rather, new varietal names, often spring into existence from the mind of some nurseryman or fruit grower. Every season new varieties are offered for sale which, in some cases, are nothing more than old varieties with new names. These impositions may be charged to one of two causes: a direct attempt to defraud the public by substituting a new name for an old one, or a less direct attempt at fraud through the loss of the original name and subsequent substitution. Neither cause is excusable. Besides this substitution of names, the planter of new varieties should remember that wide variations are found in many well-established varieties, also distinct strains. Crawford's Early and many other varieties of peaches are known to exist in distinct strains, differing in size, shape, color, season of ripening, quality, and productiveness. These varieties are probably due to bud variation and subsequent propagation, and should be borne in mind when making a selection.

COMMERCIAL VARIETIES RECOMMENDED BY PROMINENT GROWERS IN EACH  
PEACH DISTRICT OF ONTARIO.

*J. W. Smith, Winona.*

*General list in order of ripening:* Alexander, Early Rivers, Hale's Early, Yellow St. John, Early Crawford, Fitzgerald, Late Crawford, Elberta, Longhurst, Crosby, Smock.

*For long distance shipping:* Yellow St. John, Early Crawford, Elberta, Smock.

*Hardy:* Crosby, Longhurst, Lemon Free, Alexander, Early Rivers.

*For canning:* Yellow St. John, Mountain Rose, Early Crawford, Garfield, Elberta, Late Crawford, Smock.

*For evaporating:* Longhurst, Lemon Free, Smock.

*W. W. Hilborn, Leamington.*

*General list in order of ripening:* Alexander, St. John, Garfield, Early Crawford, Fitzgerald, New Prolific, Engol Mammoth, Elberta, Golden Drop, Bronson, Kalamazoo, Smock, Banner.

*For long distance shipping:* Early Crawford, Garfield, New Prolific, Elberta, Engol Mammoth, Golden Drop, Bronson, Smock, Banner.

*Hardy:* Alexander, Fitzgerald, Barnard, New Prolific, Crosby, Tyhurst, Longhurst, Lemon Free, Golden Drop, Banner.

*For canning:* St. John, Garfield, Early Crawford, Fitzgerald, New Prolific, Barnard, Engol Mammoth, Old Mixon, Mountain Rose, Crosby, Golden Drop, Lemon Free, Banner.

*For evaporating:* Garfield, Early Crawford, Barnard, New Prolific, Elberta, Golden Drop, Longhurst, Lemon Free, Smock.

*J. G. Mitchell, Clarksburg.*

*General list in order of ripening:* Triumph, Champion, Red Canada, Fitzgerald, Tyehurst, Early Crawford, Elberta, Bowslaugh's Late, Late Crawford.



*Hardy*: Triumph, Fitzgerald, Tyehurst, Bowslaugh's Late.

*Canning and evaporating*: St. John, Early Crawford, Reeve's Favorite, Elberta, Longhurst, Late Crawford, Smithson, Smock.

*W. H. Bunting, St. Catharines.*

*General list in order of ripening*: Yellow-fleshed—Triumph, St. John, Early Crawford, Brigdon, Fitzgerald, Foster, Reeve's Favorite, Chair's Choice, Elberta, Globe, Late Crawford, Smithson, Smock. White-fleshed—Alexander, Greensboro, Champion, Old Mixon Free.

*For long distance shipping*: Early Crawford, Reeve's Favorite, Elberta, Old Mixon, Globe, Late Crawford, Smithson, Smock.

*Hardy*: Triumph, St. John, Fitzgerald, Crosby, Longhurst, Smock.

A glance at these lists shows a marked partiality for varieties of yellow flesh. The same tendency is prevalent throughout the entire peach growing section of this Province, and is due largely to the popularity of the Early Crawford peach for canning purposes. While a pardonable failing, in that some yellow fleshed varieties are as desirable, if not more so, for special purposes than some white ones, yet, from a dessert standpoint, it is entirely without substantial grounds and should be amerced. It is somewhat, however, a matter of personal taste and opinion. One market seems to favor flesh of one color and another something different. The English markets, as well as many cities in America, especially Philadelphia, prefer peaches with white flesh; other markets, as New York and Toronto, favor those of yellow flesh. There is no real foundation for preferring one more than the other. For dessert purposes there are just as good peaches with white flesh as with yellow and vice versa. In fact, the flavor and quality of many of the white ones is superior to the best of the yellows.

In the great peach state of Georgia the leading varieties grown for the northern markets are white fleshed, with one notable exception, the Elberta. Here are a few well worth being adopted by our peach men, if they prove adapted to our soil and climatic conditions: Greensboro, Waddell, Carman, Hiley, Thurber, and Belle of Georgia. These are arranged in order of ripening. All have white or creamy flesh and are free or partial free-stones. Hiley and Thurber are excellent shippers and of fine appearance; the latter ripens just before the Belle of Georgia, which immediately precedes Elberta, and is the best peach of its season for commercial purposes. Hiley was awarded the Wiley medal at the second last meeting of the American Pomological Society at Boston, a most worthy distinction, this medal being given only to one new fruit each year. It certainly is a handsome peach, highly colored and showy, and ripens just before Thurber.

*Selection of Suitable Trees.* Having decided upon the varieties to be planted, the next thing is to secure trees of those varieties that will give the best possible results. In the first place, the trees must be true to variety type and not older than one year from the bud. Large trees are not always the best; medium sized ones are usually more satisfactory to plant. Whether large or small, they should be healthy, thrifty, smooth and well grown, but not spindly. They should possess good roots and be free of bruises, fungi, and injurious insects. It is best to avoid trees grown in districts subject to peach yellows, peach leaf curl, and the San Jose scale. To secure these desirable features in the trees, it is advisable to have a written agreement with the nurseryman to that effect. Allow no substitution of varieties and

reject all inferior stock. Trees for northern regions should be from a northern nursery. When convenient to a nursery, it is well to inspect the stock and buy direct from the nursery rows.

*Preparation of the Soil.* The best method of preparing the soil for peach growing is to grow a preparatory crop for one or two seasons before planting out the trees. On very rich lands, the best crop of this kind is one that will take the excess of nitrogen out of the soil and one that may be cultivated to improve the physical condition of the soil. Poor, worn-out land had better be sown to clover or some similar green crop for plowing under. If time is limited and previous cropping cannot be done, the preparation of the soil as it stands should be most thorough and complete.

All stumps, roots, stones, or other obstructions should be cleared off the land. Subsoiling is necessary when the land has a hardpan stratum resting immediately underneath the surface. All wet spots or pockets should be well under-drained, as well-drained land is an imperative necessity for successful peach culture.

The ground should be broken early in the fall to a depth of about six or eight inches. Fall cultivation should be practised to thoroughly pulverize the clods and rot the sod, and then the land should be ribbed up for winter. This is done to assist drainage, and thereby enable the land to dry off quickly early in the spring and to permit the frost to further pulverize the soil. As soon as the soil warms up in the spring, the ribs should be worked down and the land well cultivated.

*Preparation of Trees for Planting:* Before planting in the orchard, the ragged and bruised roots of the trees should be cut off to prevent rotting. This should be done smoothly with a sharp bladed knife so that the wounds will callous and heal rapidly. The tops also should be pruned back to correspond to the roots that are left, if not more severely so. Pruning back to whips is generally practised with peach trees, particularly in southern countries. A modification of this is practised in the north, each tree being pruned by cutting off all the side branches to stubs with a single bud at the base of each. The top of the tree is cut off at a distance from the ground corresponding to the length of the trunk desired for the tree. This is best done, perhaps, after the trees are set so as to have them uniform.

There is a great diversity of opinion among growers as to the proper height at which to start the head. In Canada the usual height is not less than three feet, but in the south and many of the northern states 12 to 18 inches is regarded as the best. In Ontario the relatively high head is adopted on account of the fact that the fruit is thought to ripen better on high heads, and because it is easier to cultivate the land close to the trees. While the contention that the fruit ripens better may be true, yet it has not proved to be true in the orchards of the northern states. Why should it be true in Ontario? We have yet to learn of any definite experimental data that confirms this contention.

The advantage in ease of cultivation is more worthy of consideration as the expense of working the orchards is sometimes increased by having to dig the spaces around the trees which cannot be reached by the plow or cultivator when the head is low. This extra expense can be done away with, however, by the use of up-to-date implements, adapted and made especially for this kind of orchard work. Such a machine is found in reversible cut-away orchard plows and in various extension disk harrows that are made in Canada and elsewhere.

Low-headed orchards may be worked also by plowing in spring as close to the trees as possible and then using an ordinary low spring-tooth harrow



to level this and to loosen the soil near the trees that cannot be reached with the plow. A harrow must be used that has two sections, and these sections should be extended or separated by means of a wide "evener" or "spreader" fastened between them. The width of the spreader will depend upon the distance between the plowed area and the trunks of the trees. On very light soils, a smoothing harrow may be used instead if adjusted in a similar manner. Another means of working under low-headed trees is the use of a plow followed by an ordinary plank drag. Plow as close to the trees as possible, then use the drag by driving zig-zag around and between the trees.

Some important advantages are gained by adopting low heads. The trunk of the tree is protected from the heat of the summer's sun and from sunscald in winter. A low head will stand a storm better and less attention need be given to wind-breaks for the orchard. But the advantage of most moment, and one, that to my mind, outweighs all the good features claimed for a high head, is that the fruit can be picked from the ground, no ladders being required for that purpose. In large orchards, and especially in seasons of abundant crops, and when labor is scarce as it is to-day in Ontario, this feature adequately compensates for the extra expense of cultivation, if any, and for what some growers claim may be lost through the tardy ripening of a few fruits on the lower branches.

In connection with trimming trees to whips and starting low heads, a close method of root-pruning, known as the Stringfellow method, has been widely practised and discussed, particularly in the state of Texas. The method consists in cutting off the roots to mere stubs an inch or two long and cutting back the top with corresponding severity. Although Mr. Stringfellow says: "It applies to trees of all ages, everywhere, and the larger the tree the more necessary it is to root prune," it has not proved desirable in the north, especially in the heavier soils and with large trees. It is advisable, therefore, to let well enough alone and allow the other fellow to do the experimenting.

*Planting.* Peach trees should be planted 20 by 20 feet apart, if the soil is in good condition. Some varieties require more room than others; e.g., the Elberta needs more space than the St. John as its habit of growth is more spreading. Where the soil is poor and the variety upright in growth, the trees may be planted closer. In an orchard of many varieties, it is best to choose one distance apart for all so that the long rows of trees will be in perfectly straight lines. Usually the greatest mistake in planting is in the matter of crowding. This should be avoided so as to admit of sufficient root room for the trees; also, to facilitate the operations of spraying and harvesting, to admit the sunlight and to allow of good cultivation.

The time for planting in Ontario is in spring, as early as the ground is fit to work. Planting at this time is generally considered safer than planting in the fall, as the dangers of winter-killing and heaving of the trees are averted.

There are many systems of arranging trees in the orchard, the most common of which are the square, the rectangular and the hexagonal. The simplest of these is the square system by which 108 trees, 20 feet apart, may be planted on an acre, each four adjacent trees forming a square, the rows being the same distance apart each way. Under ordinary conditions, peaches, being comparatively short-lived and not very large trees, are best planted by this method. When closer planting is desired, a better way is to plant on the rectangular system, and remove every other row of trees when they become crowded. By this method the rows are farther apart one way than the other. For instance, instead of planting 20 by 20, plant at first 12 by

16 feet and secure one or more crops from the trees when closely planted, and as soon as they begin to crowd take out the 12-foot row, leaving the trees 16 by 24 feet apart, by which distance there would be left 113 trees per acre. This method of planting is an excellent one when properly carried out. It is a dangerous one, however, for the majority of orchardists to follow as it is only the few who have the will and the heart to cut down strong vigorous trees in the prime of productiveness.

The hexagonal system is a little more complicated than either of the preceding but allows of 15 per cent. more trees to the acres without any more crowding. In this system the adjacent trees form a hexagonal figure, enclosing one tree in the centre. The trees in one row alternate with those in the next, thus forming a system of equilateral triangles. This plan may be used for peaches with advantage, but is best suited for trees of larger size such as apple orchards.

On very hilly lands, and especially where the soil is sandy and apt to be washed by rains, the rows should be laid off at water level. No regular system can be followed other than to plant horizontal lines on the sides of the ridges. In case the lines separate widely, short additional rows may be inserted to utilize the space.

To stake out an orchard on the square or rectangular plan, furrows and cross furrows may be drawn and the trees planted at the intersections. This method is only applicable to level land. A more accurate plan is to lay off the orchard by means of stakes and a long wire. The wire is stretched along one side with the ends attached to stout stakes. The desired distance apart for the trees is marked on the wire and a stake is placed at each mark to indicate the position of the tree. One of the ends is laid off at right angles in the same way and the intervening stakes are also set by means of the wire.

In the hexagonal system, the first row is staked out in much the same manner. To locate the trees at the ends of the second, the distance apart of the trees in the first row is taken as a base upon which to erect an equilateral triangle, the apex of which gives the required position. The row is then staked out as before.

For all these plans, sighting also is necessary to accurately place the stakes in line. At regular intervals, alleys and cross alleys should be made by leaving out a row of stakes. By so doing, the orchard will be laid out in blocks which will greatly facilitate labor in harvesting. There should be only one variety to a block, and all blocks of the same variety should be planted together. The orchard is now ready for the actual planting.

When the trees are brought from the nursery, the roots should be covered with wet sacking to avoid exposure to sun and wind. If they have not already been trimmed and prepared for planting, as suggested under the previous heading, it should be done at this time. At each place designated by a stake, a hole should be dug large enough to allow a full spread of roots, and deep enough to allow a few shovelfuls of rich surface soil on the bottom.

For planting small orchards, a planting board may be used to place the trees on the exact spot marked by the stake. This board is about five feet long with holes in the end and a notch in the centre. The notch is placed around the stake, wooden pins are driven into the soil through the holes in the ends, the board is removed, the stake lifted, and the hole is dug. A tree is then dropped into the hole, the board is again put in position over the wooden pins and the tree takes the place of the original stake in the central notch. This is a good method for small plantings but has no place in the work of large commercial orchards.



In setting out large plantations, a tree is planted at each end of the row, others in the centre and at intervals along the row, and, by sighting, the intervening trees are easily put in line. Two persons are needed in planting the trees, one to hold the tree and tramp the earth firmly about the roots as fast as the other throws it in. The tree should be set deep enough to place the union of the stock and bud a couple of inches below the surface of the soil. In very light soils, the peach may be planted deeper than on heavier soils. While the peach is a shallow-rooted tree and should be planted not too deeply, yet too shallow planting should be avoided, mainly to prevent the danger of washing and consequent exposure of the roots and crown; and because, on shallow-rooted trees, borers are more troublesome, as they are apt to work down underneath the roots where they cannot be reached. Too deep planting also should be avoided, as peach roots require plenty of air and are very sensitive to smothering.

On very thin soils, a handful or two of bone-dust, ashes, or some ammoniated fertilizer, mixed with the earth in the hole, may be beneficial. As soon as the orchard is planted, a record of the planting should be made, giving names and locations of varieties, names of nurserymen if trees have not been raised at home, and other bits of information for future reference.

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### ORCHARD CULTURE AND CARE.

*Inter-cropping.* Many of the leading peach growers, and some of the best writers on horticulture, advocate clean cultivation from the start for peach orchards. On the other hand, we occasionally hear of extreme cases of non-cultivation. The former is decidedly the more preferable practice, especially on light, sandy land. Happily, however, one is not required to choose either method, as between these two extremes there is a happy medium.

Cropping is allowable in a young peach orchard, if suitable crops are grown, but it should be discontinued after the third year, at the latest. Cropping gives a return from the land until the trees begin to pay for the cost of cultivation. The growing of grasses and grains should be condemned; even clovers, except for cover crops, are undesirable as they prevent cultivation. No crop should be grown that requires late tillage or late stirring of the soil at harvest time. Potatoes are objectionable for this reason. Strawberries and bush fruits should not be grown in a peach orchard; the former do not permit of good cultivation at the right time in the season, and the latter needlessly take up room as they do not bear more than a crop or two before the proper time to cut them out. Corn exhausts the soil and is not well adapted to those soils best suited for peach culture.

The best crops for this purpose are those which may be hoed and cultivated until mid-summer, and at the same time do not draw too severely upon the fertility of the soil, nor encroach upon the trees. A partial exception to this rule, however, is the practice of growing fillers until the trees commence to crowd. This was noted under the heading of planting in connection with our remarks on the rectangular system and is nothing more than a modified plan of inter-cropping. As one good crop of peaches will pay for the previous care of the orchard, this plan alone without additional inter-cropping is most commendable. Beans and peas are among the desirable crops for a peach orchard, as they are not very exhaustive and require thorough tillage. Small vegetables and tomatoes are favored by some orchardists and many other crops that meet the aforesaid requirements.

*Cultivation.* The land in a peach orchard should be thoroughly tilled every season from early spring till the middle of July or first of August. Peach trees readily respond to good cultivation. Some growers throw the soil alternately to and from the trees; however, the level cultivation is to be preferred. This cultivation should be done every two weeks or so and as soon as possible after every rain. In young orchards it should be more or less deep to induce a downward growth of the roots. In bearing orchards, shallow cultivation is the rule, and perhaps is best for the immediate benefit of the orchard; but it is thought, by some authorities, to be one of the causes of the short life of modern peach trees. Moderately deep tillage is not harmful, to say the least.

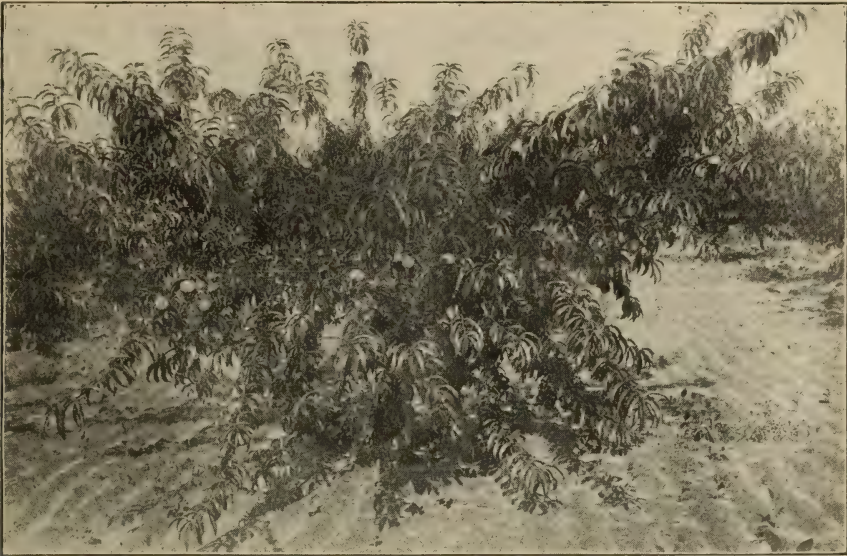


FIG. 3. Clean cultivation in the Hale orchard of low-headed trees (Belle of Georgia, 4 years old).

Spring cultivation should be fairly deep and, as the season advances, it may become shallower and lighter. About mid-summer, when the wood of the trees is nearing maturity for the season, cultivation should cease altogether. At the last cultivation, a cover crop may be sown. Although high culture and particular attention is required in the peach orchard, it can be overdone and result in an over-abundance of wood growth. Such a condition is brought about by intense and late tillage on strong, rich land.

We have not the time or space to undertake a discussion of the principles of tillage. To give us a keener appreciation of its worth, however, and to enable us to apply our knowledge more intelligently, it may be well to note briefly the benefits of the operation. The following summary is based upon and similar to the one systematized by Bailey in the "Principles of Fruit Growing":

1. Tillage improves the physical condition of the land,
  - (a) By fining the soil, and thereby presenting a greater feeding surface for roots;
  - (b) By deepening the soil, and thereby giving a greater foraging area to the plant;
  - (c) By warming and drying the soil in spring; and
  - (d) By reducing the extremities of temperature and moisture.
2. Tillage helps to conserve soil moisture,
  - (e) By increasing the water-holding capacity of the soil;



- (f) By checking evaporation; and
  - (g) By destroying weeds which appropriate moisture.
3. Tillage helps to render plant food available,
- (h) By admitting oxygen;
  - (i) By promoting nitrification;
  - (j) By directly liberating plant food; and
  - (k) By hastening the decomposition of organic matter.
4. Tillage helps to hold in check insect and fungous enemies.
5. Tillage is of more than usual benefit to peach trees during the season following winter injury. (Mo. Exp. Sta. Bull. 55).

*Implements.* The number and nature of the implements required for a peach orchard depend much upon the kind of soil and the method of cultivation to be practised. Among the most useful for general use are: One horse scuffer, for working around young trees; disk, cutaway, Acme and smoothing harrows; spring-tooth cultivator with set of wide blades; ordinary steel plows and an extension plow for getting up close to the trunks of low spreading trees; roller, orchard wagons, etc. Short whiffletrees with no projecting hooks, and harnesses with low collars and hames and no turrets, must be used to avoid injury to the trees. Various kinds of small tools, not necessary to mention, will be required, besides pruning and spraying apparatus.

*Fertilizers and Manures.* In a general way it may be said that the most essential elements of plant food for fruit orchards are nitrogen, phosphoric acid and potash. The proportion and amount of these that should be applied varies with the different kinds of fruit. For the peach, plenty of potash and phosphoric acid is required and only small quantities of nitrogen. The proportion and quantity required for a particular orchard will vary with the texture and condition of the soil and the amount and condition of availability of the plant foods it already contains. The only way to determine the wants of the soil is to experiment and note the results.

An over-supply of nitrogen is ruinous to peach trees. It has been found that: "The peach is healthiest and yields the best fruit in soils which for most crops would be considered deficient in nitrogen." Also, that trees suffer from winterkilling when overfed with nitrogen, are more liable to be infected with brown rot, and produce later and poorer crops of fruit. It is obvious, then, that one must be cautious when using nitrogenous fertilizers.

A liberal application of nitrogen is important, however, for young growing trees, and also for mature trees when the leaves appear smaller than natural and take on a yellowish color. Although this condition of the leaves usually indicates a lack of nitrogen, it also may indicate the presence of excessive moisture in the soil. Too much nitrogen is indicated by unusually dark green foliage, rank growth, large crops of small poorly colored fruit or no crop at all, and immaturity of the wood in fall. When this fertilizer is required to stimulate early growth or restore impoverished bearing trees, it is most effectively applied in the form of nitrate of soda. Another commercial form of nitrogen is sulphate of ammonium. This also may be used for peaches, but it is not so quick in its action as nitrate of soda.

The most economical method of furnishing nitrogen is by means of tillage and green leguminous manures; the former promotes nitrification; the latter indirectly adds nitrogen to the soil from the air and it also prevents the leaching of nitrates already in the soil. On poor, gravelly knolls some commercial form of nitrogen may be used with advantage, and it should be applied early in the season as late applications tend to prevent a proper ripening of the wood for winter.

Phosphoric acid in some commercial form is essential to the growing of good peaches. The tree, the fruit and the seed are all benefited most decidedly by its application. Peach soils, being light and sandy, are likely to be deficient in this constituent. In heavier soils, it is often present in an unavailable form and requires cultivation to liberate it. Phosphoric acid is usually applied to the soil in the form of bone meal or superphosphates. Bone meal also supplies a small quantity of nitrogen. Superphosphates are apt to be strongly acid and should be applied in the fall or winter when the tree is dormant, at the rate of about two hundred pounds per acre. Thomas or basic slag is a form of phosphoric acid that gives very good results on sandy soils. It must be very finely ground as it parts with its fertility very slowly. Dissolved South Carolina rock is another valuable form of this fertilizer.

Potash is the most essential element of fertility in a peach orchard. Like phosphoric acid, it induces fruitfulness rather than excessive wood growth. Chemically speaking, it forms salts of the organic acids in the plant, it is supposed to assist in the formation of starch and the assimilation of carbon, and it influences the flavor. Also, when abundantly supplied, it causes the fruit to color up better. It is often deficient in peach soils and must be supplied artificially. The most economical source of potash is unleached hardwood ashes. These also supply a small amount of phosphoric acid. The potash in wood ashes is immediately available. Forty to fifty bushels per acre is the usual rate of application. Muriate of potash is a form of potash that also gives excellent results with peach trees. It is a definite compound containing about 50 per cent. of actual potash and may be used at the rate of 200 pounds per acre. This and other references to the amount required are merely suggestions. Local conditions and experiment alone can tell. A common potassium salt used as manure is kainite. It is an impure form of muriate of potash, and contains about 13 per cent. of potash. Sulphate of potash is also used by some growers. Potassic manures should be spread over the ground when the trees are dormant in fall or spring and worked in with a cultivator. Wood ashes may be applied at any time.\*

Other elements of importance, but usually present in the soil in sufficient quantities, are lime and iron. Lime is said to strengthen the woody portions of the tree and to hasten the time of ripening of the tree and the fruit. It also has a marked effect upon the physical condition of the soil. It acts as a fertilizer to some extent by aiding nitrification and by liberating potash from insoluble compounds in the soil. Lime also is thought to favor the "catch" of clover, especially crimson clover, on light soils where cover crops are to be grown.

Iron gives a body and a flavor as well as a color to the peaches which readily distinguish them from those grown on soils lacking in this respect. The advantages in quality and color of fruit gained by the presence of iron may be overbalanced by its chemical property of rendering the super-

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\*According to Dr. Wiley, (U. S. Year Book, 1896, p. 129), muriate of potash and kainite tend to diminish the sugar content of grapes and thus impair the quality of the wine. In the case of sugar beets, also, he says their use is of doubtful propriety. The cause of the injury to these crops is found in the potassium and other chlorides which these fertilizers contain. Reasoning, then, from analogy, it is safe to say that these chlorated fertilizers should be applied with caution to peach orchards that are grown expressly or in part for wine making and the manufacture of jams and other by-products whose quality depends upon the content of sugar in the fruit. For orchards of this kind, it is safer to use potassium sulphate or wood ashes.



phosphates of the soil insoluble. There is not much danger of this, however, unless the iron is present in excessive quantities.

Barnyard manure as a fertilizer for peach trees is not favored by the majority of orchardists. Its use seems to encourage fungus diseases, more so than artificial fertilizers. Hale, the "Peach King," says that peaches stimulated by stable manures are more liable to yellows than those fertilized by commercial fertilizers. The effect of barnyard manure is similar to that of other nitrogenous fertilizers and its use may be governed by similar conditions. For young orchards on poor soil its use is beneficial. The manager of a large plantation in Georgia told the writer that he spreads two forkfuls of manure around each young tree in winter. Generally speaking, its use is confined, as in this case, to the stimulation of early growth in newly set orchards.

*Cover Crops.* Closely allied to the operations of fertilizers and tillage is the growing of cover crops. Neither can be practised economically without the aid of one or both of the others. In the general round of orchard work we fertilize during the dormant season, we cultivate in spring and early summer, and we grow cover crops in late summer and fall. When cultivation ceases, the cover crop should be sown, and in the spring, after serving as a fall and winter covering for the ground, it is plowed under.

There are two kinds of cover crops, leguminous and non-leguminous; the former increases the nitrogen content of the soil by appropriating atmospheric nitrogen; the non-leguminous adds nothing to the soil other than the plant foods taken up in its growth. Cover crops also keep the ground mellow and in good physical condition by the addition of humus; they dry the ground and prevent too rapid wood growth in fall and aid the ripening of the trees for winter; they serve as a protection for the roots; they help to free plant foods in the soil; they prevent leaching of nitrates, when the trees have ceased growth; they prevent soil erosion; they prevent the running together of hard soils; they hold rain and snow till they soak into the earth, and thus increase the moisture supply; they also increase the moisture holding capacity of the soil; they allow early tillage by drying out the soil in spring; and they keep the soil at a uniform temperature, and thus make the winter weather less severe for peach trees. Whether one or all of these benefits may be expected to follow the use of cover crops depends upon local conditions of soil and climate.

The kind of cover crop to grow is more or less a local question. Weeds are better than nothing. Certain crops do better in one part of the country than in another. In young peach orchards it is best to grow a crop of the leguminous type. In bearing orchards, it is wiser to practise a rotation and grow non-leguminous plants occasionally, as a too frequent use of leguminous crops may result in an over-supply of nitrogen.

Among the best of the legumes for cover crops in the peach districts of Ontario are crimson clover, hairy vetch, and cow peas. Crimson clover makes a thick cover before cold weather, forms a very large root growth and altogether furnishes an excellent green crop for plowing under in the north. It is sown at the rate of 15 or 20 pounds per acre, depending upon the richness of the soil. Hairy vetch makes a rank growth and is more hardy than crimson clover. It is much favored as a cover crop but, as the seed is very expensive, it is not so much used as the clovers. The mammoth and common red clovers and lucerne are also grown to some extent and give good results. In the Niagara district where a comparatively long season allows it to make a luxuriant growth, cow peas promise to be one of the most profitable and serviceable of cover crops. It is perhaps the best of crops

for this purpose in all sections favorable to its growth. It may be sown at the rate of one bushel to the acre, in drills; or two bushels to the acre when sown broadcast.

Of the non-leguminous crops, rye and oats are the most extensively grown. Rye is a very strong grower and succeeds when others fail. It should be plowed under very early in the spring as its rank growth is apt to rob the tree of its moisture. Oats make a very fair cover in the fall but die down on the approach of winter. Indian corn, buckwheat, rape and various other crops are used as covers, each more or less successful in different parts of the Province.



FIG. 4. Low-headed Elberta tree.

*Pruning.* At the time of planting, peach trees should be trimmed, both root and top, and started with low heads, as suggested under a previous heading. Opinions differ with regard to this point, as already stated, and a diversity of opinion among growers also exists with regard to the proper method of pruning the trees after they are set out. As a discussion of these various methods is scarcely necessary, we shall confine our attention to the one we think best.

During the first season after planting, any sprouts that form below the main limbs should be rubbed off. The main branches will start near the top of the trimmed whip or from the stubs that are left, depending, of course, upon the method of trimming practised. Three or four of these should be selected to form the top, and they should be started from different points on the stem, on different sides and some inches apart. This is a matter of importance, for if all the main branches come out from the same point, there is danger of splitting when the tree matures. Early the following spring, before bud growth starts, all the new growth of the previous summer should be severely cut back.

Some growers advocate cutting back the leading branches to six inches and shorter and removing most of the laterals. Others, less severe, cut back not more than half of the growth and leave both branches and laterals much



longer. The former is probably the better method as it keeps the growth of new wood close to the trunk, and, by removing some of the laterals, it makes the head less dense. In both cases the general outline of the head should be borne in mind, and the tree pruned to form a well-shaped and symmetrical top. The following spring (two years from planting), the trees should be pruned in the same manner, but with less severity. The third spring, and for two or three years following, one-half of the previous year's growth should be cut off. As the trees grow older, less and less pruning will be required. Pruning should always be done in spring to avoid extra work on account of winterkilling. It is well to say here that some of the best growers prefer to reserve the severe shortening in for the second and third years, claiming that shortening in the first year tends to make the top too compact.

When pruning peach trees, we should have a definite ideal in our mind. No kind of tree need be pruned unless there is positively good reason for so doing. Usually a good reason is not difficult to find. We should prune to accomplish something. We should know what we want to accomplish and do it. Some pointers along this line are worth mentioning. Here are some of them, briefly stated: Peach trees inclined to grow very upward should be cut back to induce them to spread. The centre of the tree should be kept open to admit the sunlight and cause the fruit to color up and mature better. All superfluous, diseased and dead branches should be removed and no limbs should be allowed to rub or cross. Leave all wounds clean and smooth, with no long stubs, and paint those above one inch in diameter with either white lead or grafting wax; another good mixture for this purpose is gum shellac dissolved in one quart alcohol to thickness of paint. Growth may be directed by cutting back to a bud pointing in the direction we wish the branch to grow. The bearing wood of peach trees, the previous season's growth, should be kept near the base of the limbs to avoid long straggling branches. The fruitfulness of shy-bearing trees may be aided more or less by summer pruning, but this must be practised with caution.

The advisability of summer pruning admits of discussion. It is a problem yet unsolved, as very little experimental work has been done along that line. If done at the right time (i.e., immediately after the fruit buds have formed), it may bring good results, but if done earlier than this it is likely to produce an extra growth of the wood. Summer pruning young trees also is in an experimental stage. Light pruning at this time to correct bad habits in the young growing trees may be advisable. If such is practised, care should be taken not to remove the tufts of leaves and buds that spring from the base of the limbs as on these are borne the first crop of fruit. Later on these may be cut out if desired. Mr. J. H. Hale has practised summer pruning young trees but now thinks he gets larger trees without such attention. Mr. Hale says he gets larger and stronger trees by no summer pruning because the tree can produce rapid growing main branches more easily than it can send out laterals on a pruned limb. This is logical; think about it.

These few suggestions on pruning would be incomplete without some words on the relation of pruning to winter injury. The danger of winterkilling is obviated somewhat by the method of pruning already outlined,—pruning annually, cutting back one-half to two-thirds of the new growth, and maintaining low open-headed trees. This tends to prevent, however, not to cure. Trees that have suffered from winter injury must be more severely dealt with. Experiments were conducted by the Missouri Experiment Station (Bull. 55) to determine the effect of severe pruning upon trees

that were injured in both bud and wood. We should like to quote the results in full, but as space is limited we shall content ourselves with one extract only: "The best results were obtained by cutting trees of bearing age back into the two to four year old wood, the severity of the cutting depending upon the age and vigor of the tree. Trees pruned in this way have practically renewed their heads. Their wood has ripened up in good condition, despite the fact that they have made six, eight and even nine feet of new wood. The smaller twigs of this new wood carried enough fruit buds to promise a full crop of fruit the next summer."

*Thinning the Fruit.* Pruning the wood and thinning the fruit are allied processes. The practice of heading-in is virtually a thinning process, as it removes a portion of the bearing wood. Any system of pruning materially affects the productiveness of the tree in the following and succeeding seasons. To supplement the work of pruning, and to affect the productiveness of the current season, it is necessary to remove by hand the superfluous fruits. By thus directly picking the redundant fruits, some very important things are accomplished; the trees will not break or be injured from an over-burden of fruit; the trees will be stronger and more shapely; the crops of fruit will be more regular; the labor in culling will be reduced; and the fruit will be greatly improved in size, quality and appearance, and consequently will bring a much better price. Thinning also is a means of insurance against insect and fungous enemies as it not only destroys infested specimens, but, by stimulating the growth of foliage and twig, it enables the tree to better withstand such depredations.

To attain ideal results in thinning, it has been said that we should aim to allow one fruit spur to bear one year and another the next, and to so perform the thinning that the bearing and unbearing spurs will be alternate on the branches. Such an ideal is most desirable but seldom practicable. Ideals of this kind are imaginary things, as a rule, and ordinarily unattainable. Practical experience teaches us a more material mode of procedure. Let us return to it. Most varieties tend to overbear. These, in fact peaches in general, can scarcely be thinned too much. The tendency is to thin too little, if thinning is practised at all. Many growers think the operation is expensive. Possibly it is at the time of thinning when the orchard is making no returns, but after-profits and increase in profits fully compensate for the early expenditure. Undoubtedly thinning pays when the trees are heavily laden. The fact that thinning is practised annually as a recognized and essential part of orchard work in the largest and most paying orchards on this continent, notably some in Michigan, and others in Georgia, of one to two thousand acres in extent, should be sufficient to convince the most sceptical that *it pays to thin*.

Peaches should be thinned as soon as the fruit is nicely formed and before the seeds commence to harden. The usual custom is to thin soon after the so-called "June drop," which takes place when the peaches are about the size of marbles. All diseased, stung, distorted and injured specimens should be picked off, regardless of position. A sufficient number of others should be removed so as to leave on the trees the best specimens, not less than five or six inches apart. The best grade of fruit is obtained when no more than three or four peaches are left on a fruiting branch, the previous year's growth.

*Top Working Bearing Trees.* When the varieties that have been planted are not suited to local and climatic conditions, or to the demands of the market, it is advisable to work them over with some variety of desired merit. This is best done by means of top-budding.



Buds may be successfully set in old wood, but to secure more certain results it is necessary to bud on wood of one season's growth. To get such, the main branches are cut back in winter to within one and a half feet of the trunk. The following season a new growth will spring from the stubs, and this may be utilized for the desired purpose. If the growth has been superfluous, only a portion of the new shoots need be budded. It may be advisable, however, to bud more than eventually will be required, so as to insure a sufficient number of perfect unions. All unions in excess of the desired number, which is usually four or five, may be removed when growth starts the following spring.

The time for budding is in August, and the process is similar to the one suggested for nursery practice. The bud should remain dormant over winter. In spring, as soon as the bud shows signs of growth, the top of the stock must be cut back close to the bud, and all other branches should be removed. By this means, a new and profitable top may be secured.

*Insects.* The scope of this article demands a few words on the insect enemies of the peach, but as the subject of insects is sufficient in itself to supply material for a whole bulletin, we are compelled to content ourselves with nothing more than a passing mention. Information regarding the identification, habits and treatment of peach insects may be had by applying to the Department of Agriculture, Toronto, or to the Biological Department, Ontario Agricultural College, Guelph. The following key to peach insects, prepared by Prof. Wm. Lochhead, Macdonald College, St. Anne de Bellevue, Que., and formerly of the O.A.C., Guelph, we reproduce in full:--

### KEY TO PEACH INSECTS.

#### A. Attacking the Root and Lower Trunk:

1. Tunneling in the bark and sap-wood of the root, causing the exudation of gum, which is seen at the base of the tree mingled with the castings. Peach Tree Borer (*Sannina exitiosa*).

#### B. Attacking the Trunk and Branches:

1. In early spring a minute caterpillar bores into the shoots of new leaves, killing the growing terminals. Peach Twig-Borer. (*Anarsia lineatella*).

2. Black hemispherical scales attached to the bark. Peach Tree Lecanium (*Lecanium persicae*).

3. A beetle eating the buds, and gnawing into the base of the twigs, causing them to break and fall. New York Weevil (*Ithycerus noveboracensis*).

4. Round scales, gray or black, twigs presenting a scurfy appearance. San José Scale (*Aspidiotus perniciosus*).

5. Oval scars and longitudinal slits on bark. Buffalo Tree-Hopper (*Ceresa bubalus*).

#### C. Attacking the Leaves:

1. Plant lice, living in colonies under the leaves, causing them to thicken and curl. Peach Tree Aphis (*Myzus persicae*).

2. Minute round scales, usually along the veins. San José Scale (*Aspidiotus perniciosus*).

3. Caterpillars protected.

(a) In a tortuous tube. Leaf Crumpler (*Phycis indiginella*).

(b) In folded leaves. Oblique Banded Leaf-roller (*Cacoecia rosaceana*).

#### D. Attacking the Fruit:

1. Long legged, yellowish beetles eating holes in half-grown peaches. Rose-chaffer (*Macrodactylus subspinosus*).

2. Large yellow hairy beetles, eating holes in ripe peaches. Bumble-flower Beetle (*Euphoria inda*).

3. Small snout-beetles making a puncture and crescent in the young fruit. Plum Curculio (*Conotrachelus nenuphar*).

*Diseases.* The diseases of the peach are numerous, and some of them quite hard to deal with. The most important in this Province are brown rot, leaf curl, and yellows. Details of information regarding these may be had by applying to the authorities spoken of under the preceding heading. As with insects, we must limit our remarks upon diseases to merely a list.

The following key to peach diseases was prepared also by Prof. Loch-head, specially for this bulletin:

#### KEY TO PEACH DISEASES.

##### A. *The Roots.*

- (a) Soft corky enlargements usually at the crown of the root, causing the death of the trees before they have attained full growth. Crown Gall (*Dendrophagus globus*, Toumey).

##### B. *The Stem and Branches.*

- (a) The buds unfold prematurely and the new shoots become slender, sickly and yellow. The Yellows.
- (b) The buds form compact tufts or rosettes, containing one or two hundred leaves, which are yellowish green. The Rosette.
- (c) A copious outflow of gum upon the twigs and branches usually from spots near the buds. Gummosis or Gum Flow.
- (d) New shoots become thickened and enlarged. Leaf-Curl (*Exoascus deformans*).
- (e) Winter buds do not sprout as in the case of Yellows; leaves dwarfed and yellow from the first. Little Peach.

##### C. *The Leaves.*

- (a) In May and June the leaves curl up, become deformed, much thickened and pale yellowish green, then rosy or purplish in color. Affected trees lose their leaves before midsummer. Leaf Curl (*Exoascus deformans*).
- (b) Numerous minute brown spots on the under surface of the leaves which fall early. Peach Rust (*Puccinia pruni-spinosæ*).
- (c) Minute purplish spots appear; later, the tissue dies, and minute holes like shot-holes appear in the leaf. Shot-Hole Fungus (*Cylindrosporium padi*).
- (d) A white mildew appears on the leaves. Rose Mildew (*Sphaerotheca pannosa*).
- (e) White mould-like growth, causing the leaves to become hard and curled. Peach Mildew (*Podosphaera oxycanthæ*).

##### D. *The Fruit.*

- (a) Scattered tufts of a brownish mould first appear, followed by a soft rot. Later the fruit dries, and may remain on the tree over winter as "mummies." Brown Rot (*Monilia fructigena*).
- (b) Sooty-black spots or patches on the fruit, often accompanied with cracks. Peach Scab (*Cladosporium carpophilum*).
- (c) Minute light-brown, velvety spots with a reddish border, frequently resembling minute pustules. Brown or Pustular Spot (*Helminthosporium carpophilum*).
- (d) Large light-colored spots with formation of many hairs or fuzz: Under these spots the flesh becomes hard. Rose Mildew (*Sphaerotheca pannosa*).
- (e) Irregular, mouldy patches on the surface, followed by a cracking of the fruit. Peach Mildew (*Podosphaera oxycanthæ*).
- (f) Tardy ripening of the fruit, which is dwarfed in size; no red spotting of skin or flesh. Little Peach.
- (g) Premature ripening of the fruit, which is red spotted and streaked. The Yellows.

*Some Thoughts on Spraying.* Although we have requested the reader to look elsewhere for information regarding insects and diseases, and the best means of combatting them, we shall consider here for a moment a few thoughts on spraying. Spraying is a means to an end. In peach growing, the end in view is to produce in quantity a grade of peaches that approaches as near as possible the ideal looked for in the particular variety or varieties grown. Spraying helps the grower to do this. It increases the percentage of high grade fruit by holding within bounds the ravages of the aforementioned insect and fungous enemies.



To spray intelligently, we must study the enemies to be warred against. The time to spray, and the method of treatment depends entirely upon the particular case at hand. We must know definitely the peculiarities and the vulnerable points in the life cycle of the pest to be treated. Besides this, a well informed orchardist must be somewhat familiar with the chemistry of insecticides and fungicides.

A knowledge of insects is important because many of them necessitate peculiar methods of treatment. Insects that work beneath the soil, or those that work within the wood require remedial measures different to those adopted for surface working insects. Other cases also requiring special attention might be mentioned. As a general thing, however, remedial measures are determined by classifying insects into two groups, viz., sucking and biting. For sucking insects, some substance is used which will kill by contact, either as a caustic or by closing the breathing pores and smothering. Biting insects are treated by direct poisons, which may be applied to the plant, and which will be swallowed by the insect. For both classes, certain obnoxious substances used as repellant are sometimes valuable.



Fig. 5. Trees sprayed with lime for winter protection, O. A. C., Guelph.

The vulnerable spot in the life history of fungi is usually found in the spore. These are produced at different times by the various species of fungi and are disseminated in many ways, and some species are quite difficult to combat. For these reasons, the treatment must be largely preventive, not curative. The work of applying the fungicide must be done thoroughly and at a proper time. Every portion of the leaf and branch must be covered with the spray. The number of applications depends upon atmospheric conditions. Dry weather is unfavorable to the growth of most fungi, moisture affording more congenial conditions.

To spray effectively, proper apparatus must be used, and to spray economically the best of apparatus is none too good. Apparatus should be selected that is thoroughly adapted to the work, simple and strong in construction, and easy to operate. The fittings with which the spraying mixture comes in contact should be of brass. As part of the fittings, there must be a good agitator to keep the mixture stirred. Many styles of spray

pumps are on the market. One cannot say which is the best. When buying, we should select one that is strong and durable, efficient and cheap. While the cheapest is not always the best nor the best always the cheapest it is not particularly gratifying to find that we have paid more than the pump is worth, even though a good one. Next to the pump itself is the nozzle, and probably it is the more important of the two, as upon it depends the thoroughness and economy of the operation of spraying. The best nozzle, it has been said, is one that will give the finest possible spray with the greatest possible force. It also should be durable, strong and efficient, and not subject to clogging.



FIG. 6. Unwhitened and whitened Flemish Beauty pear trees, O. A. C., Guelph.

*Winter Protection.* Outside of the peach belt of Ontario, the Niagara District and that portion of the Province fringing on the Great Lakes—the growing of peaches as an industry has many drawbacks. Even in favored sections, peach growing is attended with many difficulties. The cold winter, the lateness of spring, and the tenderness of the peach tree make difficult its culture. To overcome to a certain extent these difficulties, the grower must acquaint himself with the best methods for protecting the trees in winter. Some are already familiar with this phase of the question; others are not, so a few suggestions along this line may be of value.

The most serious hindrance to successful peach culture in Ontario is the winter-killing of the fruit-buds. In some parts of the Province good crops of peaches are grown with very little winter protection. In other



portions, however, it is absolutely essential to protect the tender buds in winter. Our changeable climate makes the question of winter protection important in all parts of the Province.

Winter-killing is attributed to various causes, some of which are: (1) immaturity of the wood and buds in fall, due to late cultivation, excessive use of nitrogenous fertilizers, or warm autumn rains; (2) severe and continued freezing is sometimes directly responsible; (3) sudden changes of temperature, causing sudden thawing and sudden freezing; (4) swelling of buds during warm days in winter, and subsequent freezing; (5) an excess of humidity in the soil which is apt to favor the premature flowing of the sap in early spring; and (6) an unfavorable exposure.

Probably the most practical methods of protecting peach trees are wrapping (*i.e.*, closely drawing together the branches, and wrapping with cornstalks, straw or canvas), and whitewashing. Layering, or laying down the trees in autumn, and covering with soil, spruce boughs



FIG. 7. Peach trees unsprayed and sprayed in young orchard, O.A.C., Guelph.

or other material, is resorted to with more or less success, but is, under most conditions, a rather laborious and expensive practice. Whitewashing the branches and buds, being of more recent introduction, has not yet received the attention its merits deserve. It is, nevertheless, the most promising means of winter protection yet suggested. Whitewashing retards the bloom, as heat is reflected by whitened buds, rather than absorbed. Experiments have been conducted along this line by Prof. J. C. Whitten, Horticulturist at the Missouri Experiment Station, also, by W. M. Orr, Fruitland, a prominent Ontario fruit grower, and by W. T. Macoun, Central Experimental Farm, Ottawa. Peach buds are known to swell and start into growth during warm spells in late winter and early spring. In explanation of this, Bailey says: "The bursting vegetation of springtime is supported by a local store of nutriment, and is more or less independent of root action." An erroneous idea regarding this fact exists among certain fruit growers, some of whom believe that buds cannot swell or grow while the roots remain frozen or dormant. Both direct experiment, and the study of plant physiology, prove this to be untrue.

Regarding the experiments at Missouri, Prof. Whitten says: "Whitened buds remained practically dormant until April, when unprotected buds swelled perceptibly during warm days late in February and early in

March. Whitened buds blossomed three to six days later than unprotected buds. Eighty per cent. of whitened buds passed the winter safely, when only twenty per cent. of unwhitened buds passed the winter unharmed."

Mr. Orr's experiments also showed that sprayed trees were later in blooming than those untreated. The tests made at Ottawa confirm these, and in addition it was found that spraying with lime was effective, to a great extent, in killing the oyster-shell bark-louse. It is also claimed that whitewashing in winter will greatly lessen the damage done on different classes of fruits by such insects as the borers, and by fungous diseases, such as the peach curl.

The use of the lime-sulphur wash also has an effect in delaying the blooming period, but, as it is not applied until early spring, its value in this respect is not marked. Before the customary time for applying this wash, peach and other tender trees are liable to injury. For purposes of winter protection, a lime wash must be applied earlier in the season.



FIG. 8. Apple trees in young orchard, O.A.C., Guelph. Unsprayed buds of tree in foreground, bursting into growth. Sprayed trees dormant.

Whitewashing should be done early in winter; apply two coats and repeat as often as required to keep the trees white. The following formula was used in some confirmatory experiments, conducted by the writer at Guelph during the winter of 1901-02, and gave good results:

Lime .....	2 lbs.
Water .....	1 gal.
Skim milk .....	1 qt.
Salt .....	5 ozs.

Slake the lime in warm water, stir to slake quickly and well, add remainder of ingredients and mix thoroughly. Then strain through a sieve, having a mesh of one-twelfth of an inch in diameter. Apply when hot with a spray pump, fitted with a Bordeaux nozzle. Amount necessary, averages one gallon to a tree at each spraying; time required to apply, five to ten minutes; cost, eight to ten cents per tree for the winter. A brief account of the work in winter spraying at Guelph will be found near the end of this article.



## HARVESTING AND MARKETING THE PRODUCT.

*Picking.* Numerous system of paying pickers are practised. One grower pays by the day, another by the crate, another by the average, and others by something else. There is no uniform system of payment employed in this or any other country. Perhaps such is not necessary. The one outlined below was noted by the writer when in Georgia, and could be adopted by Ontario growers with advantage: Before leaving for the orchard in the morning, each picker is given a sack containing a number of tickets, each ticket bearing the number of the picker to whom it belongs. In the orchard, the picker places a ticket in each basket of peaches that he picks. When the fruit reaches the grader in the shed, he takes care of the tickets he finds in the bottom of the baskets and gives them to the time-keeper.

The time-keeper credits the grader with the quantity of tickets that he (the grader) has gathered from the baskets, and credits the pickers with the quantity of tickets received bearing that individual picker's number; hence, one lot of tickets suffices for both pickers and graders. The pickers (packers and graders also) are paid so much per day with advantage of increase over average number of baskets picked, or crates packed during the day.

For example, at the Hale orchards, the packers are paid one dollar for the average number of crates that day. If the average for the day happens to be fifty crates, each packer receives two cents per crate for the work he has done. The packer who has packed over 50 (the average) is paid at the rate of two cents per crate, and the one who has packed less than the average, receives a corresponding decrease. The following day the variety and grade of peaches being packed, may be larger or smaller, as the case may be; if the former, the average will be higher and the packers will receive a lower rate per crate, or if the latter, a relatively low average will be the result, and a correspondingly high rate per crate.

This system of paying the fruit workers,—known as the “average system,”—is satisfactory both to employer and employee. The former gets more work done for less money than he could by any other system of payment, and the employee who is a little better than the other fellow, feels that his efforts are being substantially recognized. Personally, I may say that at first I thought the system unfair to the employee, and it certainly would be if all the packers were experts, as then the average always would be high; but, after talking with the packers, I found that all appeared to be pleased and satisfied with the method, on account of the fact that from day to day throughout the season new and inexperienced hands are employed, who tend to keep down the average, and enable thereby the best workers to make a good showing above the average for the day.

To fully estimate the advantage of the system to the employer, I noted, on a particular day, the difference between the results of this system and those of a system practiced on a neighboring orchard.

*Hale's*—150 crates for \$1.00 (average system).

*Neighbor*—40 crates for \$1.00 (day system).

I have referred to the packers and packing for convenience in explaining the system, not because they alone are paid in this way. Such is not the case, as the same method is used in paying the pickers and the graders, and with the same degree of satisfaction and success.

The pickers are handled in the orchard as follows: Over every twenty-five pickers is one foreman, with assistant if necessary. To prevent delay, each picker carries a couple of baskets to the orchard, where they are started picking, one picker to a row. When picking, a ticket is first placed in the basket, then the peaches, and when the basket is full it is left under the tree. The baskets are then carried by boys to convenient places for loading on single horse orchard wagons, (known in Georgia as "Dunkirks"), which go about among the trees gathering up the baskets and carrying them to the avenues where they are transferred to larger wagons or lorreys ("floats") that ply between the orchard and the packing shed.

These lorreys leave the barns loaded with empty baskets in the morning. In the orchard, the empties are distributed by basket boys, who



FIG. 9. No ladders are required to pick peaches from low-headed trees.

should keep ahead of the pickers to prevent loss of time. Four or five basket boys are required for twenty-five pickers. Two boys are also employed to keep pickers supplied with drinking water. This is merely an outline of the orchard practice, and may not be suited to all conditions, as at all times and in all orchards it is necessary to adjust labor to suit existing circumstances.

The trees are gone over two or three times to get the fruit at the proper stage of maturity. Practice soon teaches the pickers the proper stage for picking. In general, the fruit is in the right condition when it is full grown, but yet firm, and when the ground color takes on a faint yellowish tinge.

The opinion is commonly held by many growers, that peaches should be picked on the green side of maturity, to insure the best keeping quality. Investigations show this opinion to be erroneous. Experience teaches that peaches keep best when picked fully matured, full grown, well colored, yet



firm, but by no means either ripe or green. Peaches that are picked too green will shrink rather than ripen, and they never attain their proper flavor.

Regarding this question, Prof. G. H. Powell, Pomologist in Charge Fruit Storage Investigations, Washington, D.C., says: "In our fruit investigations we have observed that after green fruit is picked, it ripens more quickly than more mature fruit of the same variety, and the chemical changes have been shown to progress more rapidly. Green picked fruit, therefore, reaches the end of its life in the warehouse (or car, when in transit) as quickly, or even more so than the latter. Poorly colored fruit brings the lowest price; it does not attract the customer; it never acquires that exquisite bouquet, or aroma, or that fine quality that is characteristic of a highly colored, well-matured specimen."

There is another point in connection with the picking of peaches that deserves attention, and, judging from my observations, a word of caution. Oftentimes on display in the market, we see peaches, originally



FIG. 10. Picking Baskets and Carrier of second grade Elbertas, showing a 2-1 pack.

high grade, showing the effects of bad handling. This condition may be due to poor methods of picking, or to subsequent rough handling on the market stand. If the trouble is to be found in the orchard, it should be remedied. Picking methods, for good results, demand that the fruit be handled more like eggs than potatoes. The picker must be careful to grasp the peaches very lightly, and to drop them into the basket with care, or he will bruise them and cause them to become discolored. Peaches should be handled tenderly and as little as possible, for every evidence of careless handling detracts from both their market and shipping value.

*Grading.* Nowhere in America, perhaps, is there a more perfect system of handling peaches than that practised in the Hale orchards. Their methods of picking, packing and selling are most worthy of being adopted in the orchards of Ontario and elsewhere. For this reason, we shall refer to their methods somewhat fully in our remarks upon these phases of the industry, adapting them, however, as far as possible to our own condition. The system of grading and sorting is as methodical as the system of picking. Each packer has a grader, who grades the peaches according to size and variety. Each variety is usually assorted into three grades, each grade being marked in accordance with the grade mark chosen by the grower as

there has been no uniform marks adopted as yet in Georgia. Hale marks the first grade, extra fancy; second, fancy; the third, the name of the variety only. Thus:

No. 1	.....	X Fancy Elberta
No. 2	.....	Fancy Elberta
No. 3	.....	Elberta

The graders are constantly watched and instructed by experts. All ill-shaped, bruised, rotten and very small peaches are thrown out and sent to the distillery. The best of them may be used in cannery or evaporating plant.

As a rule, the Georgia grower prefers hand grading to machines. Mr. S. H. Rumph, of Marshallville, Ga., the originator of the Elberta, favors the mechanical grader and has a number of them in operation that do very good work. They are made by Messrs. Maul & Miller, Crescent City, Florida. Personally, I noted that this particular grader was all-right as far as the assortment of sizes was concerned, but it failed to reject the bruised and bad-shaped fruit, and besides, I was rather disappointed with its speed. I shall not presume to condemn it, however, as I may not have seen it under favorable conditions. Hale says this is probably the best grader made, but all are unsatisfactory.

Under the head of picking, we considered the method of keeping tally with, and paying, the graders.

**Packing.** Mr. Hale uses different packs for the different varieties and grades, the size of the peach determining the pack to use, and all his peaches are packed in the standard six-basket Georgia carrier. As it is rather difficult to explain in writing the various packs used, the reader is referred to the accompanying cuts for a fuller understanding.

For sizes or grades that make *three layers* in a basket or "cup" of the carrier, a 2-2, a 3-2, or a 3-3 pack may be used. For *four layers*, a 4-3 or 4-4 pack can be used, but it seldom pays to systematically pack peaches of this size. For *two layers* (usually first grade), it is best and necessary in most cases to use a 2-1 pack, although sometimes to make the cup high enough, it is necessary to place the bottom layer on end. Packing on end, however, is resorted to very seldom. It is a bad practise. Rather than pack on end, it is better to change the pack, using three layers and a corresponding system that will bring the peaches to the right height.

The carriers used for grades Nos. 1 and 2 are neatly labelled. No. 3 goes into plain crates, having no mark other than the name of the variety. In all of them the peaches are firmly packed to prevent change of position and bruising while in transit. The rosy cheek of the peach is placed uppermost, and the peaches are all pointed the same way in the cup. When the carrier is filled the packer puts his ticket on it and sends it to the nailing table where it is inspected. If found satisfactory, the cover is nailed on immediately and it is carried to the car; if not packed to suit the inspector, it is sent back to be re-packed by the packer, whose number corresponds to the number found on the ticket.

Some growers use what is termed a "spring" pack; i.e., a full layer on the bottom of the cup, a partial layer in the centre and another full one on top. In reality, it is a false pack, and one that is unsatisfactory as it is liable to become loose before it reaches the market. Other growers use a two layer pack with both layers on end. Peaches packed in this manner are apt to become crushed through pressure of the crate top on the tender



end of the peach. In the Hale orchards, peachers are packed on end only when absolutely necessary and that is seldom; in Ontario, in our Climax basket, it is the universal practise to pack on end and this practise should be condemned.

The point or apex of the peach is the most tender part of the fruit, as it ripens first; hence, when peaches are packed on end they are apt—almost sure—to become crushed by the pressure of the upper layers, and when the baskets are piled, by the weight of the upper tiers. Probably the unsuitableness of the Climax basket for fancy packing is one of the reasons why the Ontario grower packs peaches on end. And this leads to a few thoughts on another phase of our subject.

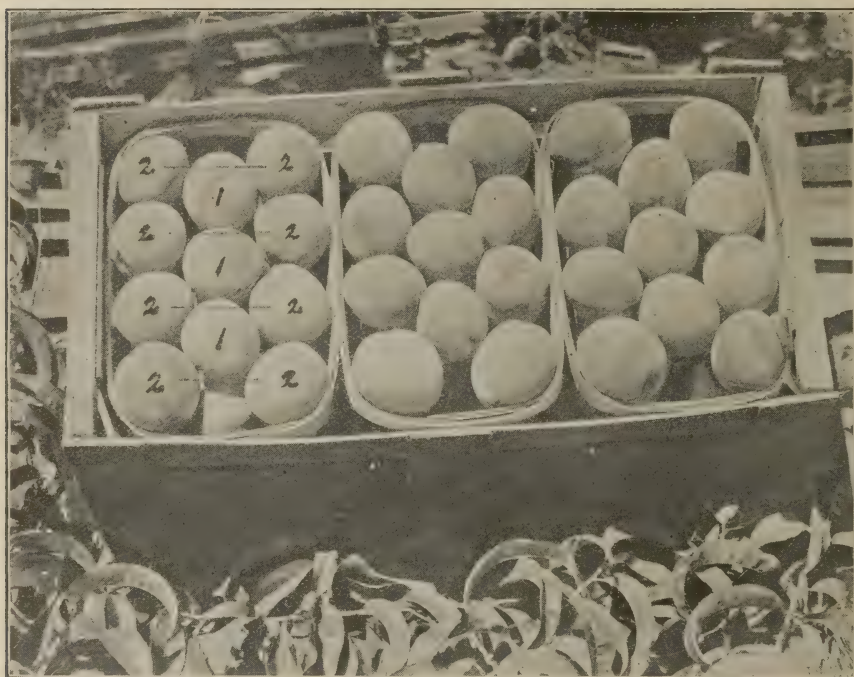


FIG. 11. Elbertas, in Georgia carrier, showing a 2-1 pack.

The oftener I see and study the behavior of peaches in the Climax basket, the less favorably impressed I am with its utility as a package for high-grade and fancy fruit. It certainly is a most satisfactory package for some kinds and grades, but for all classes and grades that require systematic packing, or "laying up" as some people call it, it is "not in it" with the Georgia carrier, and some of the other styles of packages used in other countries. The Climax basket is not adapted to fancy packing. The top is not properly covered to keep any one of the various packs firmly in position. The sides and handles of the basket are not sufficiently rigid to admit of any pack other than what would be termed in Georgia or California a straight 4-4, three-layer pack. This is the simplest of all the peach packs and apparently it is the only one known to most of the packers I have seen at work in our peach districts. The cause is easily found. While a score of different packs can be put in the Climax basket, the foregoing is

the only one that reasonably can be expected to keep its place. The practice of spreading the handle when the cover is put on, loosens the fruit and, as a consequence, a fancy pack would be spoiled. Even the customary 4-4 pack often reaches its destination in a disordered state. The Climax basket is objectionable also, in the fact that the flimsy leno cover permits tampering with the fruit, and also allows dust and dirt to enter. One of the first needs of our fruit industry to-day is a better package and better packing for our fancy fruits. I personally would recommend for peaches, the adoption of the six-basket carrier at present so largely used in nearly all states of the Union, and which I shall attempt to describe under the following heading.

*Packages.* In Georgia they use a light carrier containing six baskets, holding four quarts each. It is a very strong package, gives good ventilation, is neat in appearance, and costs only 12 cents with the divider, six baskets and cover. The best type of carrier is one that is put together with strong wire staples well clinched on the inside, and is made by the Georgia Fruit Package Co., Fort Valley, Ga. The panel heads afford a secure grip to the hands, and damage from breakage rarely occurs. When loaded in cars, the shape of the package permits a perfect fit; the tiers are separated for ventilation by means of inch slats tacked across the ends of the packages. This package is worthy of universal adoption. Michigan uses it for her best grades of peaches. Nearly all the southern states have adopted it. Texas, a coming peach state, and where to-day thousands of acres are being planted, adopted it at the outset. In Canada, where no uniform peach and plum package has yet been adopted, it should receive the closest examination and the consideration of each and every grower. Even though it might cost more to make it in Ontario than in Georgia, the package would be cheap at twice the price mentioned.

In the economics of fruit marketing, the package plays a most important part, and a uniform package should be used. Sometimes, when a man handles peaches solely upon his own account, and for a local fancy market, he can advertise his goods with advantage by adopting a package unlike those in common use. As an illustration of a most unique and striking package, something decidedly out of the ordinary, it may be interesting to mention one originated and used by the proprietors of a large fruit house in Buenos Ayres, Argentine Republic, where the writer spent some months during 1904 and 1905. This package is made of a species of swamp grass or rush, fitted in a skeleton framework of wood. The rushes are placed side by side and fastened at both ends, and in the middle, by strands of light wire. The light framework of wood which encloses the inner rush package is stained crimson or some other color that is attractive. This package may be made any size; it gives good ventilation; is neat in appearance; lessens the danger of bruising to the lowest degree; is easily handled; and is strong enough for its purpose,—a local fancy trade with private customers; but it has no place in the list of packages for export or for even the general home market. It is mentioned here for the benefit of the few who may have occasion to use a package of this type. The adoption of un-uniform styles of packages, however, may be carried too far and lead to confusion. It is imperative to the success of our peach industry that a uniform package be used.

For foreign shipments, different styles of packages have been used, and others are constantly being tested. So much depends upon the condition and particular grade of fruit, and upon the available means of transportation, and very much also depends upon the demands of the market to be



catered for, that I shall not now presume to mention others than the carrier and a very good package that is extensively used in some peach sections of the United States and Canada, shown in Fig. 12.

*Wrapping.* Experience is teaching growers that it pays to wrap peaches. It prevents bruising and the spread of brown rot (*Monilia*), adds to the appearance of the package, and above all, it increases the profits. Trial shipments from Georgia have brought fifty cents per carrier more than for unwrapped. This is worth considering when the extra cost to wrap a carrier amounts to no more than six cents. Fairly heavy paper has given better results than tissue paper.

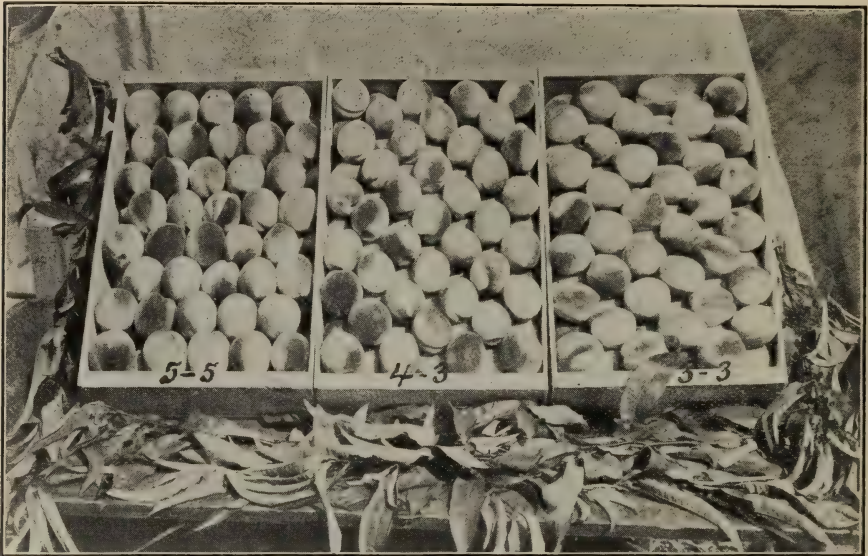


FIG. 12. Peaches for export unwrapped, showing three styles of packs.

One report from New York stated that in carriers that contained unwrapped peaches, 10 to 15 per cent. were bad, while only 5 per cent. were bad in carriers that were wrapped. Similar reports have been received from Winnipeg with respect to peaches shipped there from the Niagara district.

Wrapping seems to add or bring out the color. Mr. Hale says: "Wrapping is decidedly the best caper for soundness and color." From now on he expects to wrap a large portion of his output. Other growers in Georgia, many in other States, and the leading shippers in Canada, are doing the same.

In cold storage, the effect of wrapping is not so noticeable on peaches as on other classes of fruit, mainly because peaches as a rule are not stored long enough for any advantages to be well marked. Experiments show, however, that wrapped peaches retain their firmness and brightness longer and are less apt to show a discoloration of their compressed sides when removed.

*Shipping and Selling.* After fruit has been packed for market, the next thing is to get it to its destination in the best possible condition at the least possible cost. This is the actual transportation problem and it involves many minor problems of more or less importance in themselves—whether or

not peaches should be cooled before shipment; the question of a proper system of refrigerator cars and railway facilities for shipment to the local market, the North-West market, or to the seaboard for export; the proper means of transferring shipments from car to steamship, when foreign consignments are in transit; the advisability of official inspection at the wharf; ocean transportation, including refrigeration, with adequate ventilation and thermographs for registering the fluctuations of temperature; and finally, the handling and disposal of the fruit on the market, at home or abroad. These are questions that require expert study and investigation. Both Dominion and Provincial Governments are doing excellent work in these directions, not so much with peaches perhaps as with apples and pears, but there is no reason why our peaches cannot be placed on the English markets. The authorities at Washington have shipped peaches to England with success. The Ontario grower can do likewise, even though a few trial shipments have not proved satisfactory. The solutions of the problems mentioned above



FIG. 13. Peaches wrapped for export.

rests as much with the grower as with the government. Many prominent fruit men are, by individual or collective means, aiding the government to solve these problems. Others, however, fail to recognize the fact that the successful transportation and marketing of peaches is dependent largely upon the quality of the work that has been put upon the orchards, and upon the preparation of the fruit for shipping. No system of transportation can insure the safe delivery of peaches that have been handed over for transportation in a condition unfit for safe carriage. The problem of transportation begins with the picking of the fruit and involves all operations in succession from the tree to the consumer.

At the Hale orchards the carriers are loaded into the cars at the packing house and through trains carry them to New York and all points in the north. A fast schedule is arranged for these trains to deliver the fruit on the market in the best possible condition. The cars are iced three times between Fort Valley and New York. These cars are forty feet in length and when loaded about two-thirds full, five tiers high, they carry 560 carriers; in wet seasons, the number is reduced one tier.



There are many different types of refrigerator cars now in use, some with the ice chambers on the end, some iced over head and others iced in various ways; none are entirely satisfactory. The objection to them lies not so much in the method of icing, as in the lack of proper ventilation, and, as a consequence, it is difficult to maintain an even temperature. Investigations show that different temperature are found in different styles of cars and in cars of the same style. As a rule, the temperature at the top of the car ranges ten degrees higher than that at the bottom. This, aided by the moisture thrown off from the fresh peaches, is favorable to the spread of brown rot (*Monilia*), and should be remedied. Quick refrigeration is essential to prevent the spread of this fungus, which can do so much damage in 24 hours.

No refrigerator car yet constructed, whether in Canada or the United States, can give quick refrigeration. For this reason, it is advisable, when possible, to have the fruit cooled before it enters the car. Furthermore, the fruit can be picked in better condition, riper and more mature. A local cold storage plant, adjoining packing house, into which the fruit could be placed and cooled before it goes into the car, should be considered a part of the equipment of our up-to-date orchards. Such is feasible, however, only on large plantations or in connection with co-operative central packing houses.

Safe commerce in fruits depends upon the quality and appearance of the commodity that we have to offer and upon the value that we may get for it. High grade peaches are always in demand. It is only the inferior grades that go begging for a market. What the market wants first of all is soundness and good-keeping qualities, and nearly uniform size throughout the package. Uniformity in appearance and size means a good deal. It means the difference between high and low prices. To secure uniformity in packing from any one particular locality by individual shipments is an impossibility. The solution of the question lies in co-operation.

The Ontario peach industry is reaching that stage where individual effort must give way to co-operation. The ordinary individual alone cannot command the same attention and the same market that he can when working in company with others. Of course, a co-operative shipping association has its disadvantages as well as its advantages. The difficulty of maintaining a uniform grade is one of its most serious drawbacks, but this can be overcome by co-operating earlier in the game. The best system of co-operation begins in the orchard, or if this is not practicable, co-operative packing is. Unless the packing and grading of peaches is superintended by one man it is impossible to secure uniformity. A co-operative association organized solely for the purpose of selling is all right in theory, but in practice it is usually found wanting. To insure success in co-operation, the association must control the packing as well as the selling. Such an association has many advantages. A better distribution of the crop is secured. The association is in a better position than the individual to keep in touch with the needs of the market, and, as a consequence, "gluts" are less likely to occur. Salesmen can be employed who will sell the fruit to the best advantage. Uniformity in packing and in packages can be had. Men can be hired and fruit packages can be bought to better advantage. Better and cheaper storage and transportation can be secured. Higher prices and better markets can be commanded by controlling the output. The profits of the middle or commission man can largely be done away with.

Shipping and selling on commission is a most unsatisfactory way of marketing peaches. There are times and seasons, however, when it is necessary to sell in this way. In such circumstances, the peach grower individually or collectively should ship to only one commission house in the same market. By so doing, he will not compete against himself, and, by careful grading and honest packing, his fruit often may be sold before it reaches the market. He should keep in close touch with his commission man and the market generally. He also should use a private telegraph code to make communications secret and to lessen the expense of telegraphing.

Some markets prefer a yellow-fleshed peach to a white and *vice versa*. Large peaches do not always bring the most money; sometimes they bring less. On many occasions I have known cases of second-grade Elbertas to bring twenty-five cents more than the same day's quotation for first-grade.



FIG. 14.: It requires thrift, industry and intelligence to grow peaches like these. Seventy-two bouncers to a carrier.

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### THE SURPLUS AND BY-PRODUCTS.

*Gluts in the Market.* The purpose of this section of our article on the peach industry is to offer a few suggestions that may help the orchardist to overcome a very serious cause of loss in successful peach culture, a drawback that affects, in seasons of abundant crops, the entire peach growing area of the Province, viz., the occasional demoralizing "gluts" or "slumps" in the market that break down prices and discourage growers, old and new alike. Naturally, the question might arise: What is the cause of such gluts in the market? Are they the result of over-production? Economists say that there is no over-production of any article so long as there is a person in the world in need of such article. Such is rather a broad view of the situation; yet, when we follow their argument further and attribute the fault to the lack of proper distribution, rather than consider it the result of over-production, the force of the thought is apparent. The crying need of the peach industry is for a system of distribution that will insure a greater demand for our produce, and, as a consequence, better prices.



Just how to establish a well organized system of distribution is a difficult problem to solve. It is a noticeable fact that, when slumps occur in large cities, there often are smaller towns where peaches cannot be bought at any price. Probably the solution of the problem lies in co-operation. Some arrangement with dealers in small towns by which they may communicate their needs to the larger dealers of the cities, and through the latter to the peach growing centres, would certainly tend to lessen the difficulty. By this means, the empty and full markets could be located and shipments consigned accordingly.

Another way to avoid gluts in the market lies in co-operation with the railway lines. To place peaches on distant markets in good condition we require a better system of refrigerator cars and quicker transportation than are now at our command. The objection to the present styles of cars was noted under the heading of shipping. To better the condition of things in this respect, railway lines should be asked to supply a class of cars adapted in all respects to the requirements of the perishable peach. A fast schedule for such cars should also be asked for, or rather it should be demanded, as peaches cannot be handled as ordinary freight and reach the market in prime condition. And, to reciprocate, peach growers must ship regularly and in quantities sufficiently large to make it worth while for the railway companies to meet these demands.

An apparent local over-production of peaches is due sometimes to faulty methods of marketing. A good article, true to name and grade, and put up in clean and uniform packages, always brings a good price in any market. Poor fruit, dishonestly graded and packed in packages scarcely fit for potatoes, is difficult to sell at any time. As a rule, the grower who offers for sale a class of peaches that is a little better than the other fellow's, will find a ready demand for the product of his pains in any market that is overstocked with inferior peaches, and even high grade peaches, in inferior packages.

When all resources fail to bring good prices for the peach crop in the fresh state, it is necessary to find other means for its disposal. Eating when ripe is certainly the most agreeable way of using peaches; probably nine-tenths of all grown are eaten in their uncooked states. But large quantities are also canned, evaporated, distilled and disposed of in other ways. The question of handling to advantage the surplus and by-products of the peach industry is a most important one to all orchardists. There is no necessity for the grower to suffer loss in years of abundance, when there are so many ways in which the surplus fruit, both good and bad, may be saved from the hog pen and the compost. By means of the canning factory, the evaporating plant, and the distillery, we can utilize fruit that would otherwise be a loss to the grower. Other means, as noted in the following pages, may also be resorted to. In all these cases, numerous and various methods are practised. It is not our purpose to discuss them all in minute detail, nor to intimate that the systems noted in the following paragraphs are the ones *par excellence*. What we do present for the reader's consideration is the result of our observations, limited though they may be.

*Commercial Canning.* This is a business by itself and one that requires expert management to be a success. The average fruit-grower who intended to go in for canning as a business would have to employ an experienced canner, as it would not be possible for him to attend to the orchard, the gathering of the fruit, and the management of the cannery at the same time. To be successful, a cannery must be run for as long a season as possible and with economy, so as to do the largest amount of work for the capi-

tal invested; and nothing but standard or high-grade fruit should be put up, so that a name and reputation for reliability and excellence of the output can be established. Unless the orchard be of large size and planted with selected varieties, ripening in succession, and especially adapted for canning, it would not be possible for the individual grower to keep up a constant supply of suitable fruit for the cannery from any one orchard. For these reasons it is obvious that the average fruit grower, without experience, would in all probability fail to make a success of the canning business. A more practical idea would be the establishment of co-operative canneries in the centres of our principal fruit growing districts.

One of the simpler processes of canning peaches that I noted in the south may be briefly described as follows: The fruit, on arrival at the cannery, is first halved, pits removed and peeled. This is done by women who are paid so much per bushel for the work, usually about twenty cents. About 75 good peelers are required to turn out 10,000 cans of first-grade fruit per day. For low grade fruit, such as "peeled pie"—which is only another name for fruit-pulp—more peelers are necessary. In both cases foremen should instruct and watch the peeling.

From the peelers the peaches are carried by boys to the packing or filling tables. Here they are placed in cans, the size of which depends upon the grade of fruit being put up. Standards, or first grades, are packed full and tightly into the cans; second grade and peeled pie are placed into the cans only two-thirds full. About twenty or twenty-five packers are required to handle the peaches for the above mentioned daily output.

To aid in its preservation, the higher grades are sweetened, either with sugar or syrup. The latter is made by dissolving the best crystalline cane sugar in boiling water, and is added when cold till the can is completely filled with fruit and syrup. A more common method, however, is to place the sugar directly into the cans, and before the peaches are put in. Enough sugar for each can is added to make what is termed a twenty degree syrup. The strength of the syrup varies, however, according to the quality of the fruit being put up.

After the sugar and fruit is added, the cans are "trayed off" (i.e., placed on wooden trays containing a definite number of cans each), taken to the water tank and filled with water.

The trays are now placed in an "exhaust" box and steamed; standards, jacket pie (unpeeled peaches) and peeled pie for five minutes, second grade for three minutes. This is done to have the peaches thoroughly heated before covers are put on, in order to insure a better state of preservation. The time for steaming can only be known by practice, the above mentioned time being only approximate.

From the exhaust box the fruit is taken and placed on a wiping table, where a girl wipes off the tops of the cans with a brush. To keep tally of the work done by the "cappers," who are to follow, the girl places a check or ticket on each tray.

The cappers then take the cans, pocket the checks, and "cap" the cans; i.e., solder on the lids. A vent-hole in centre of cover, to allow air to escape when capping, is also tipped with solder. The cappers should mark the cans (each man having a distinct mark) to trace the origin of possible leaks. Three men can cap and tip 10,000 cans in ten hours. They are paid by the piece, usually about \$1.50 per 1,000.

After capping, the cans are placed in iron cages and "processed;" i.e., submerged in boiling water and cooked till the fruit has reached the proper



degree. In the cooking of the fruit expert knowledge is absolutely necessary, as no hard-and-fast rules can be laid down. It is simply a question of practical experience, and depends entirely upon the variety and grade of fruit, its ripeness, texture and cooking qualities. The time required for peaches to be properly cooked and to acquire their full flavor may vary from five to twenty minutes. The following, however, may serve as an estimate:

Standards .....	9 minutes.
Jacket Pie .....	12 "
Seconds .....	8 "
Peeled Pie .....	12 "

As soon as processed, the cans are removed to a vat of cold water, where they are cooled. They are then stored for a week or ten days, so as to show up any leaks that may occur. These are thrown out and the good cans prepared for sale.

The remainder of the work is merely finishing, and consists in coating the ends of the cans with blue or bronze, to improve their appearance; labeling, for which purpose a good show lithograph should be used; and the final packing in cases, also labelled, for the market.

*Peach Pulp.* Under the previous section of this article we referred more or less to the manufacture of peach pulp, or pie fruit, as it is sometimes called; but, as there has been a considerable interest among fruit growers regarding the matter, and as literature on the subject is scarce and difficult to find, a few additional suggestions may be appropriate.

The particular value of fruit pulp is that it is a cheap means of preserving the inferior fruit that is not good enough for canning; and we are enabled, thereby, to keep it until convenient to make it into jam. At home and where the facilities for canning are not available, all surplus peaches that are sound, whether high grade or inferior, may be utilized in this manner. It is only in the commercial canning factory that the manufacture of pulp is reserved for the inferior fruit.

The main difference between ordinary canned fruit and the preparation of peach pulp is that in the latter there is no sugar or syrup used in its preservation. The peaches should be halved, peeled and cut into pieces, the size of which will depend upon the soundness of the fruit. These are placed into cans of some uniform size, water is added to cover it, and it is steamed, as previously mentioned. Where steaming is not practicable, the lid may be put on as soon as the cans are filled, leaving a vent-hole in the centre. The cans may then be placed directly into the boiling water and cooked until the whole of the contents is raised to boiling point, and all the air in the cans has been driven off. The time required to cook pulp will vary from ten to twenty-five minutes, according to the condition of the fruit being put up. The vent-hole is then closed and the cooking is complete. The cans are examined for leaks the same as for ordinary canned fruit.

In some factories, the pulp is cooked in bulk and stored in barrels. At a more convenient season, it is either sold as pulp or manufactured into jam.

*Home Canning.* The fundamental principle involved in canning, whether at home or in the factory, is that of destroying the germs of fermentation by the application of heat. It is essential that this principle be recognized in order to retain much of the natural flavor and richness of the fruit and to insure its preservation.

Many methods of preserving peaches in the home are practised. One only I shall briefly attempt to outline. After the fruit has been prepared,

as previously described under the head of commercial canning, it is placed in jars before cooking, and covered with syrup. The jars are then put in a large oval boiler or other suitable vessel, having some device to prevent the jars coming in contact with the metal bottom, and being broken during the cooking. Cold water is then added to the vessel till it reaches the neck of the jars. This is slowly heated to the boiling point, at which stage the peaches should be sufficiently cooked. The lids should be put on immediately and the jars sealed air-tight, as the fruit will not keep otherwise.

*Drying.* Canada to-day is dependent almost entirely upon other countries for her dried fruits. This should not be in a favored country like ours, where nearly all classes and varieties of fruit suitable for drying can be grown successfully. True, our climatic conditions will not allow us to compete favorably with those countries that dry their fruits by means of the sun's rays and in the open air; yet, in mechanical evaporation, we have a means at our disposal by which we may materially increase our home production of this commodity, and relatively decrease our foreign importation.

Peaches are dried by three methods, viz., sun-drying, house-drying, and machine-drying or evaporating. The selection and preparation of the fruit is practically the same in all cases, but the after treatment differs in many respects. A full discussion of these methods would require a series of articles; so, in order to keep this section of our article within reasonable space, I shall condense it and treat the subject in a general way rather than attempt a lengthy discussion of details.

*Sun-Drying.* This process is not practicable in Canada, although in some of the peach sections, with proper care and attention at night, it might be practiced to supplement the work of the evaporator. In reality, it can only be depended upon in countries that have long seasons of warm weather, and where the air is dry and the nights dewless.

*House-Drying.* Every peach grower whose means and limited acreage do not warrant the necessary cost of a mechanical evaporating plant, should have one or more simply constructed drying houses. These may be built by any ordinary carpenter in a few days. All that is required is a room, ceiled closely, with rests for fruit racks, having slatted bottoms, arranged all around the walls. A good large stove in the centre of the room, keeping the temperature up to 150 degrees, will dry the peaches in about two days.

*Evaporation.* Probably the most economical and profitable process known for the preservation of peaches is that of evaporation. Peaches dried in a well managed, up-to-date evaporating plant are said to be more nutritious and digestible, to keep better and longer, and to command a better price in the market than those preserved by the sun and the older methods of drying. In order to retain the natural richness and flavor of the fruit, and to insure its preservation, it is necessary to keep the temperature in the evaporator as high as possible without injury to the fruit, and to keep a continuous, rapid circulation of air throughout the compartment.

The peaches should be cut evenly in halves, and the pits removed. If the market price and demand for peeled peaches over unpeeled is sufficiently more to pay the grower for the extra trouble and expense of peeling, they should be peeled. As a rule, most of the dried peaches found on the market are unpeeled. Place evenly on trays or screens with the cut side up.

Whether or not the trays should be submitted to the fumes of sulphur is a matter of taste and opinion. Sulphuring is a bleaching process, and greatly improves the color, especially of old, off-colored fruit. The time allowed should only be long enough to fix the color, as any exposure beyond this will injure the quality of the fruit. To bring about this condition some



growers use a small quantity of sulphur, and expose the peaches for two hours or more, others use a comparatively large amount, and expose relatively only a short time. The exposure differs with the variety, and with the same variety in different conditions, and must be learned by experience. When properly fumigated, the peaches are placed in the evaporator. To secure the best flavor, see that the green fruit is always nearest to the heat, and that the dried fruit comes out at the top. The temperature for drying and the length of time required differs with the different styles of evaporators. In some styles the temperature is kept as high as 200 degrees F. for eighteen to twenty-four hours; in others, more or less as the case may be. The important point to observe in this respect is not the amount of heat, but uniformity. The time required for the peaches to dry properly can only be determined by observation and experience, and the degree of heat.

The fruit should be removed from the evaporator while quite pliable, and not allowed to over-dry. It is then placed in bins or on the floor of the fruit house, turned over occasionally, and allowed to remain until it has passed through the sweating process. It is then graded into various sizes and conditions of color, and packed into clean, uniform packages. The best grades are "faced" in the boxes. Some fair specimens of the fruit to be packed are flattened by running through a wringer or specially constructed pair of rollers. The flattened fruit is placed in the box, cut side down. The box then is filled to the top, the bottom is nailed on, the package inverted and the bottom becomes the top.

The proportion of evaporated from fresh peaches varies with the variety, from five to eight pounds to the bushel is a fair estimate. Peaches should be quite ripe to dry nicely. Early varieties are not satisfactory, as they are too watery, and not well enough matured near the pit.

*Evaporators.* There are many styles of evaporators on the market, from the small family affair, to be set on the back of a cook stove and capable of drying about three bushels of fruit per diem, to the giant factory driers, capable of turning out several hundred bushels daily. Among the latter are horizontal evaporators, towers or stacks, steam tray evaporators, air-blast evaporators, and various others. Before purchasing, a careful investigation should be made, with a view of finding the one of the desired capacity that will produce the best results at the least cost.

Two methods are involved in the process of evaporation; one by the rapid circulation of heated air, and the other by steam pipes laid in horizontal tiers and passing back and forth through the chamber of the evaporator. This latter method is probably the most efficient and economical for very large establishments. The heat is more uniform, more evenly distributed, and more completely within the control of the operator than when hot air is used, and there is less danger of scorching the fruit. The use of hot air, however, is most generally adopted. The apparatus required is less expensive, and with a little care and experience to keep up an even temperature of sufficient heat with perfect circulation, just as good an article may be turned out.

In all hot air evaporators, the heat is supplied by a furnace, below the trays. This furnace is filled with draughts so that the temperature may be controlled. Fresh air is drawn in through specially-arranged inlets, heated, and passed either over or through the fruit on the trays.

In the best forms of commercial evaporators, the fresh fruit is put in at the bottom (i.e., nearest to the heat), and the dried fruit comes out at the top. By means of a mechanical contrivance worked by a crank, the whole stack of trays is raised one notch or space to admit each fresh tray at the

bottom. The fruit is dry when it reaches the top of the stack. The trays are then removed, emptied, refilled with fresh fruit and used again. Thus the system is continuous, and during the busy season such a machine may be worked day and night.

Good machines for use either on a large or small scale can be obtained in Canada. Additional apparatus, bleachers, slicers, parers, etc., also are necessary to the complete equipment of an up-to-date establishment.

*Peach Jam.* Jams are most commonly made from plums and small fruits. A good jam may also be made of peaches when other means for disposing of the surplus are not available. Small and bruised peaches, if used when fresh, may be utilized in this manner—though first-class jam should be made from first-class fruit. The process of jam making noted by the writer is a simple one. The fruit is placed in a steam-jacketed kettle and one-half or three-quarters of a pound of sugar is added for every one pound of fruit. It is then boiled until of the required consistency, poured into cans or jars and sealed down air-tight at once. The English market demands glass jars. When for home use, the jam may be made in any iron or copper kettle, lined with enamel, over a slow fire. If such is used, it is necessary to stir constantly to prevent scorching, and the impurities that rise to the surface should be removed.

*Peach Butter.* This by-product of the peach orchard is made and put up in much the same manner as recommended for jam, differing only in being spiced and in the quantity of sugar used. Large quantities of peach butter are used in England like jam, as a substitute for common butter.

*Peach Jelly.* This is one of the most attractive forms in which peaches are placed upon the market. It is sold at a large profit to the producer, as pure jellies are scarce and high-priced. It is made from pure peach juice and sugar in various proportions, personal and market preferences determining the ratio. Some manufacturers use sugar enough to produce a twenty-degree reading on the saccharometer, others use as high as equal proportions of sugar and juice. Peaches for jelly should be sound and fully ripe. The pits should be removed and the fruit crushed in a press. The juice is then filtered, the sugar is added and it is boiled incessantly for about eight minutes, when it should reach the right consistency: *i.e.*, will keep its shape up-ended when cold. The jelly is then put up for market in much the same way as recommended for jam.

*Crystallized Peaches.* The production of candied or crystallized fruits is carried on most extensively in California and France. Even in those countries the product is not large, as the process is not a definite one, being more or less in an experimental stage. Wickson's "California Fruits" states that "The theory is to extract the juice from the fruit, and replace it with sugar syrup, which, upon hardening, preserves the fruit from decay, and at the same time retains the natural shape of the fruit. Though the method is very simple there is a certain skill required that is acquired only by practice."

*Brandied Peaches.* In the preparation of brandied peaches, only sound, full-grown, and not quite ripe fruit should be used. Each specimen is wiped clean, and pricked to the centre with a silver or wooden instrument. The fruit is then placed in water heated almost to boiling point, removed from the fire and allowed to stand ten minutes. After heating again, it is thrown into ice-cold water. When cold and drained it is put into a tub of brandy (55 per cent. alcohol) and allowed to stand for six days. Next the fruit is placed in jars. To each gallon of brandy, in which the fruit has been soaked, add four ounces of sugar and heat to 200 degrees F. Fill the



jars containing the peaches with the hot sweetened brandy, and seal air-tight. Store in a dark, cool place. Spice, essence of cinnamon or cloves, may be added to the brandy, before the fruit is put in. This process is recommended by the North Carolina State Board of Agriculture.

*Unfermented Peach Juice.* Peach juice makes a delicious and nourishing summer drink. It is used in the preparation of syrup for soda fountains and it has a wholesome value in cookery. The demand for fruit juices is increasing and is such as to warrant a greater effort on the part of the manufacturer to supply a pure and attractive article. In making peach juice, the fruit is crushed, pressed, and filtered. The juice is then clarified by adding the white of two eggs for each gallon of juice. Then heat nearly to boiling point. After allowing to stand for two hours, siphon off into bottles. Place these in cold water, heat to boiling and seal air-tight. Allow bottles to cool gradually and store in cool, dark, dry cellar.

*Peach Wine.* From time immemorial, sparkling wines have played a prominent part in the celebration of all momentous events and happy occasions. Sparkling wines are made from the juice of black grapes; ordinary wines may be made from the juices of various fruits, including peaches, and even tomatoes. Sparkling wine differs from ordinary wine in that it contains a considerable quantity of carbonic acid gas, which has been retained in the wine by bottling it before the completion of the alcoholic fermentation.

Good sparkling wine is difficult to make. Perfect quality, which depends upon the selection of the raw material and the perfection of the process, is secured only by delicate skill, precision, and long experience. Ordinary wine, sweet or dry, is simple enough to make and may be prepared in the orchard of any peach grower. Quicker and probably more profitable returns may be secured, however, by utilizing the surplus peaches in the cannery or evaporator.

*Peach Brandy:* Sixty years ago, peaches, in many parts of America, were raised principally for distillation. Every peach growing centre had its distillery and every planter had a large share of his crop turned into brandy. Peaches were cheap then and good brandy could be bought for fifty cents and less per gallon. This was before the days of internal revenue. To-day distilleries are few and far between, and peaches are raised chiefly for consumption in the fresh state, and peach distilleries are few and far between.

The following outline, though not complete, will give a general idea of the process: The peaches which should be fully ripe are placed in barrels and mashed to promote fermentation. When doing this, care should be taken not to break the pits, as such when broken and boiled liberate prussic acid which tends to make the brandy bitter. The barrels are allowed to stand eight to twelve days, seldom longer. The pomace is then put into the still, about two-thirds full, and boiled for about three and one-half hours. Boiling may be quicker, but a slow process brings out the most brandy. When the condensed brandy commences to run, it is filtered through charcoal suspended in a keg by means of a double flannel cloth. The first run may be comparatively weak, around 70 proof; the last, usually very strong, about 150 proof; the average, however, will be about the desired standard, usually 100 proof. The liquor is barrelled as soon as distilled, bunged up tightly, and allowed to stand some months before using. Brandy will vary in body and flavor, strength and delicacy according to the richness of the pomace, the amount of care and experience exercised in its manufacture, and the length of time it stands in the wood.

*Vinegar.* Vinegar is generally made from apple and grape juice, although an equally fine article may also be made from refuse peaches. The fruit is placed in casks, mashed and thoroughly broken up, allowed to stand for a sufficient length of time, and the liquid is drawn off into clean casks as it accumulates. In these new vessels it is allowed to stand for some time, and, if sediment settles, it should again be drawn off before finally being put away for use.

*Miscellaneous.* Fallen fruit is unfit for any purpose except as food for hogs or as a fertilizer. Swine turned into the orchard to forage upon fallen peaches not only increase in value themselves, but they also destroy infesting insect larvae and fungous diseases and they add fertility to the soil through their excrement. The particular value of peaches as a fertilizer is not known to the writer. In some peach sections it is a common practice to return the culls and refuse to the soil. Fallen peaches may also be gathered and dried for their seeds.

Peach pits may be utilized by planting in the home nursery or by selling to professional nurserymen who usually pay a good price for selected seed. It is well to observe that pits from the distillery or cannery, where they have been boiled, are unfit for nursery practice. In England, an essence of some kind is extracted from the pits and a very appetizing beverage may be made from them as follows: Remove the kernels from the pits and crush them in water, filter, add sugar to suit taste and boil.

Noyau, a by-product of the peach industry, is "a cordial made from brandy sweetened and flavored with orange peel and the kernels of peach stones, bitter almonds and the like." It is also made by steeping the leaves of the peach in spirits. The leaves yield also a milder liquor that is used for flavoring cookery. The blossoms and the buds yield, by a system of distillation, agreeable and fairly pure perfumes.

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## WINTER SPRAYING.

During the winter of 1901-02, the writer undertook some experiments in the orchards of the Ontario Agricultural College on winter spraying. The work was performed not with the idea of presenting anything new, but to confirm the experiments of Prof. Whitten in Missouri and of Prof. Macoun and others in Canada, and to determine whether or not the advantages in retarding bud growth and aiding tender fruit trees to escape the stimulating effects of warm spells in winter and subsequent injury from freezing, claimed for winter spraying with whitewash, were to be had at Guelph. Should such results be secured, and they have been, a second purpose of our work was to emphasize still further these advantages, and also to draw the attention of Ontario fruit growers more closely to the fact that, in winter whitewashing they have a means at their disposal by which peach trees in peach sections may be grown with less risk than in the past, and a means by which the present peach growing area may be enlarged.

Originally we intended to conduct rather extensive experiments along different lines in this connection, and we may do so yet. Pressure of time and other duties, however, did not allow us to carry out these good intentions. Unfavorable weather conditions stepped in also and spoiled the possibility of definite results in more than one phase of our work. For these



reasons we have decided to confine our remarks to a brief statement of the work done and the results obtained in two lines of the work only; viz.:

- 1. Retarding bud growth in spring, and
- 2. The effect of whitewash on the oyster-shell bark-louse.

*Retarding Bud Growth in Spring:* During warm days in February and early spring, peach buds are apt to start into growth and, in the event of subsequent freezing, they are more than likely to be winter-killed. The

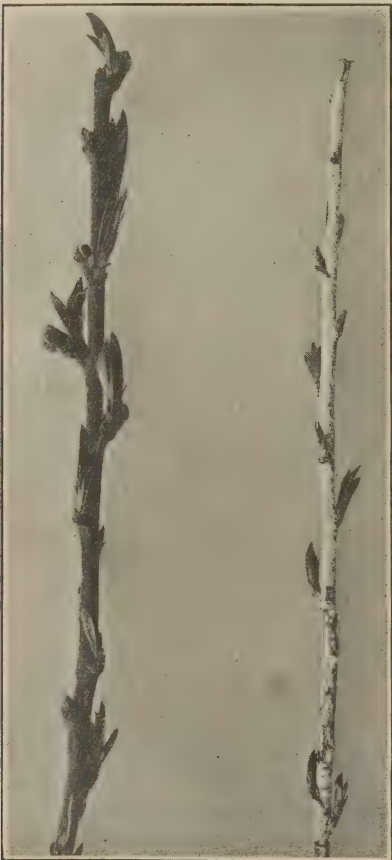


FIG. 15. Hill's Chili peach twigs, unsprayed and sprayed.

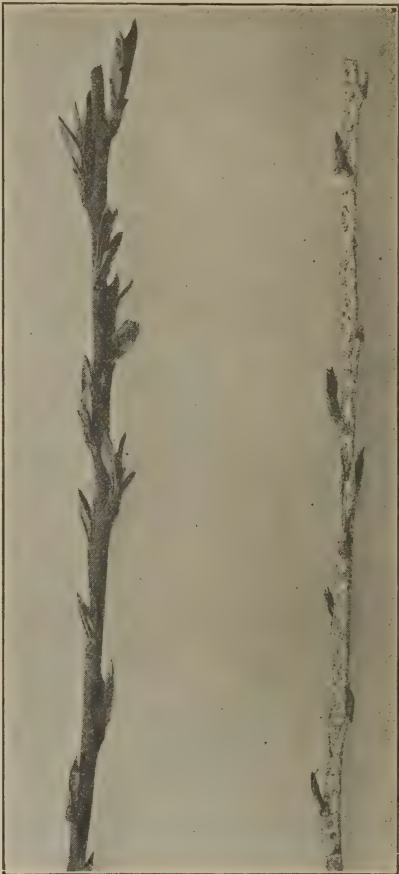


FIG. 16. Bernard's Early peach twigs, unsprayed and sprayed.

best means known to prevent this premature swelling of the buds is white-washing the trees. Whitewash reflects rather than absorbs the heat, and, as a consequence, it holds the buds back and allows them to escape injury from winter-killing. The whitewash should be applied early in winter, giving two coats, and repeated often enough to keep the trees white. The mixture used in our experiments was prepared in the following proportions:

Lime .....	2 lbs.
Water .....	1 gal.
Skim milk .....	1 qt.
Salt.....	5 ozs.

The lime was slaked in a small amount of warm water and stirred so that it would slake well. The remaining ingredients and water were added and the whole was mixed by stirring thoroughly. After straining through a one-twelfth inch sieve the mixture was applied immediately to the trees. The trees selected for this experiment were apples, pears, and peaches. The following table gives the dates of spraying, dates of bud swelling and results.

APPLE TREES.	Date of 1st spraying.	Date of 2nd spraying.	Date of 3rd spraying.	Date of bud swelling.	Results.
St. Lawrence, sprayed..	Jan. 2....	Feb. 10 ...	March 15..	April 19...	Buds retarded
"    unsprayed ..	Jan. 2....	Feb. 10 ...	March 15..	"    16...	three days.
Gravenstein, sprayed ..	Jan. 2....	Feb. 10 ...	March 15..	"    15...	Buds retarded
"    unsprayed ..	Jan. 2....	Feb. 10 ...	March 15..	"    10...	five days.
PEAR TREES.					
Flemish Beauty, sprayed	Jan. 4....	Feb. 10 ...	March 15..	April 28...	Buds retarded
"    unsprayed ..	Jan. 4....	Feb. 10 ...	March 15..	"    19...	nine days.
Bessemianka, sprayed ..	Jan. 4....	Feb. 10 ...	March 15..	"    26...	Buds retarded
"    unsprayed ..	Jan. 4....	Feb. 10 ...	March 15..	"    19...	seven days.
PEACH TREES.					
Hill's Chili, sprayed ...	Jan. 2....	Feb. 10 ...	March 15..	April 22...	Buds retarded
"    unsprayed ..	Jan. 2....	Feb. 10 ...	March 15..	"    11...	eleven days. <sup>19</sup>
Barnard's Early, sprayed	Jan. 2....	Feb. 10 ...	March 15..	"    19...	Buds retarded
"    unsprayed ..	Jan. 2....	Feb. 10 ...	March 15..	"    14...	five days.

The results of these tests show that whitewashing has a most decided effect upon the relative dates of bud growth on sprayed and unsprayed trees. In two particular cases, Flemish Beauty pear and Hill's Chili peach, the effect is most marked, and may have been influenced partly by other causes and conditions. To more fully appreciate these effects, we have only to glance at the accompanying cuts (Figs. 15, 16, 17, and 18) of twigs from the different trees under experiment. All of them were taken on the same day and are twigs of the previous season's growth.

*The Effect of Whitewash on the Oyster-shell Bark-louse.* In a series of experiments at Ottawa, Macoun found that whitewashing is a promising means of eradicating the oyster-shell bark-louse. The effect of one lime was to loosen the scales and expose the underlying eggs to the action of the weather, and ultimately bring about the removal of the scales from the trees by rain and wind. In the course of the experiments, it was also found that the lime, in itself, did not injure or kill the eggs within the scales, nor was there any noticeable injurious effects from its use on the trees sprayed.

To corroborate these results, in a small way, we sprayed at Guelph two infested Wealthy apple trees with a mixture of lime and water in the following proportion :

Lime .....	2 lbs.
Water .....	1 gal.



The condition of the trees, before and after spraying, and other information is given in the following table. The results obtained are by no



FIG. 17. Gravenstein apple twigs, unsprayed and sprayed.

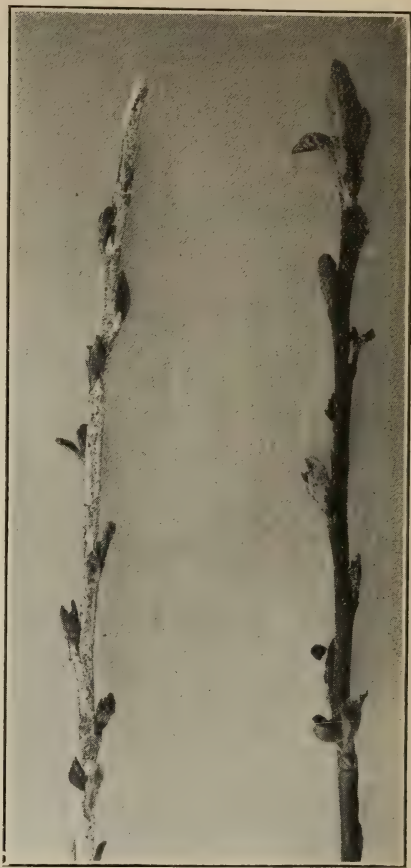


FIG. 18. St. Lawrence apple twigs, sprayed and unsprayed.

means conclusive, as the experiment was limited in its scope, was subject possibly to unfavorable conditions, and was performed but once.

WHITEWASHING TREES INFESTED WITH OYSTER-SHELL BARK-LOUSE.

Before spraying.	1st spraying.	2nd spraying.	Condition April 15, following.	Condition Sept. 15, following.	Remarks.
	1901.	1902.			
No. 1. Infested considerably; not badly.	Dec. 31..	Feb. 10..	Infested considerably; no apparent change.	Still considerably infested; a slight decrease in number of scales.	Results poor.
No. 2. Infested badly.	Dec. 31..	Feb. 10..	Still infested considerably, but remaining scales easily removed by slight stroke of hand on limb.	Still slightly infested, but most of the scales had been removed during summer.	Results convincing

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Thirteenth Annual Report

OF THE

# Fruit Experiment Stations

of Ontario

UNDER THE JOINT CONTROL OF

THE ONTARIO AGRICULTURE COLLEGE, GUELPH

AND

THE FRUIT GROWERS' ASSOCIATION OF ONTARIO

1906

PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO





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TORONTO

To the Honorable WILLIAM MORTIMER CLARK, K.C.,  
*Lieutenant-Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOR :

I have the pleasure to present herewith for the consideration of your Honour the Report of the Fruit Experiment Stations for 1906.

Respectfully yours,

NELSON MONTEITH,

*Minister of Agriculture.*

TORONTO, 1907.



## FRUIT EXPERIMENT STATIONS.

### BOARD OF CONTROL, 1907.

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P. W. HODGETTS .....	Secretary O. F. G. A.

## THE ONTARIO FRUIT EXPERIMENT STATIONS, 1907.

<i>Name.</i>	<i>Specialty.</i>	<i>Experimenter.</i>
1. Southwestern.....	Peaches.....	J. L. HILBORN, Leamington.
2. Essex .....	Vegetables.....	E. E. ADAMS, Leamington.
3. Wentworth.....	Grapes.....	MURRAY PETTIT, Winona.
4. Burlington.....	Blackberries and Currants.....	A. W. PEART, Burlington.
5. Lake Huron.....	Raspberries, Gooseberries and Plums.....	A. E. SHERRINGTON, Walkerton.
6. Georgian Bay.....	Plums.....	J. G. MITCHELL, Clarksburg.
7. Simcoe.....	Hardy Apples and Hardy Cherries.....	G. C. CASTON, Craighurst.
8. Bay of Quinte.....	Apples.....	W. H. DEMPSEY, Trenton.
9. St. Lawrence.....	Hardy Plums and Hardy Pears.....	HAROLD JONES, Maitland.
10. Algoma.....	Hardy Fruits.....	CHAS. YOUNG, Algoma.
11. Maplehurst.....	General Collection of Cherries, Peaches, Grapes and Pears for comparative study.....	THE SECRETARY.

### CO-OPERATIVE WORK.

Strawberries.....	Rev. E. B. STEVENSON, Guelph.
Vegetables and Strawberries.....	PROF. H. L. HUTT, O. A. C., Guelph.
Hardy Fruits.....	W. T. MACOUN, C. E. F., Ottawa.
".....	C. CHAPMAN, Judge. Ont.
".....	B. BISBE, New Liskeard, Ont.

# Fruit Experiment Stations, 1906.

## THE SECRETARY'S REPORT.

By LINUS WOOLVERTON, GRIMSBY.

Owing to the uncertainty on the part of the Board with regard to the extent which the Experimental Fruit Farm at Jordan Harbor will take over the work of our present stations, very few new varieties of fruit were sent out to our fruit stations in the spring of 1906.

It is, however, recommended that several of them be continued, so as to work in co-operation with the new station at Jordan Harbor, and test the adaptabilities of varieties to the various districts of the Province. Much valuable information for farmers in Algoma is being obtained at the Algoma stations, and the Board has instructed me to send liberal supplies of promising varieties to Mr. Chas. Young for future experimentation.

Two farmers who have recently settled in New Ontario have applied for collections of varieties for testing there, to see if some fruits will succeed; and the Board has instructed me to furnish them varieties for co-operation. Already we have sent to Mr. C. Chapman, Judge, Ont., the following list which he reported alive in the fall of 1906.

**APPLES:** Transparent, Astrachan, Duchess, McIntosh, Charlamoff, Wealthy, Gideon, Transcendent, Hibernial, Hyslop, Whitney, Martha.

**PLUMS:** Burbank, Chabot, Red June, Hawkeye, Stoddart, Wolf; also some small fruits. A larger and better assortment will be tried next spring.

Among experiments to be conducted at the Jordan Experimental Fruit Farm the Board recommend the propagation of peaches on different stocks, especially upon the St. Julian and the American plum stocks, and have them tested at our various stations to see if peaches so propagated will not withstand the cold in sections such as in Essex, where they are subject to root killing; and also enable fruit growers who have clay soil to grow peaches.

A vegetable experiment station has been opened at Leamington, and the Board has appointed Mr. E. E. Adams, of Leamington, to take up this work. The secretary has been authorised to procure seeds for this work, and to outline the following lines of work for 1907, viz.:—(1) Testing all varieties of early tomatoes; (2) Methods of pruning and training late tomatoes; (3) Varieties of sweet potatoes for profit; (4) Notes on forcing crops; (5) Comparison between sprouted and the sprouted potatoes for planting.

The financial report of the year, as submitted to the Board by the Secretary was as follows:



## FINANCIAL STATEMENT FOR 1906.

Salaries of Experimenters .....	\$1,975 00
Fruit Exhibits, Industrial, \$ 79 11 )	
Massey Hall, 157 42 )	236 53
Travelling Expenses of Inspectors .....	154 43
Photographs .....	12 00
Salary of Secretary .....	300 00
Salary of Inspector .....	100 00
Board Meetings .....	54 37
Committees .....	27 65
Postage .....	10 00
Stock for Stations .....	37 80
Express charges .....	9 85
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## THE DOMINION CONFERENCE.

Acting under instructions from our own executive, and with the permission of the Hon. Minister of Agriculture, I attended the second conference of Fruit Growers of the Dominion of Canada, held at Ottawa, March 20, 21 and 22, 1906.

In comparing notes we found very few present who were in attendance at the First Conference at Ottawa, at which I was also present as a delegate from the Ontario Fruit Growers' Association.

On the afternoon of the second day, His Excellency the Governor-General being present, I was called upon by the Hon. Sydney Fisher to give an address on Fruit Experimental work in the Province of Ontario, and was followed by Prof. F. C. Sears for Nova Scotia; A. T. Peters for New Brunswick; A. G. Glendennan for Alberta; and Martin Burrill for British Columbia.

I gave a summary of our work in the past, and suggested that a Dominion official might collect data on fruits tested in the various provinces for the general good, and might aid in securing a common nomenclature for all fruits grown in the Dominion. Among other things I suggested the advisability of some method of guarding the rights of originators of valuable new fruits, and possibly providing some method of public recognition of valuable services in this direction.

Prof. H. L. Hutt, of our Board, was also present, and gave an account of the co-operative work in fruit accomplished by the Ontario Agricultural College.

## THE HORTICULTURAL EXHIBITION.

At the request of your secretary, the experimenters sent in collections of fruit from their stations to Massey Hall. These arrived on Monday the 5th of November, when your Secretary was in attendance, and secured space for each station. One long table, the length of the basement, was secured for our fruit station exhibit, and was filled from end to end.

I had four signs placed conspicuously upon the table, showing the character of the exhibits, and I was in attendance to answer questions the whole week.

Our bulletin on fruits recommended for planting in Ontario was freely distributed during the fair. I secured several hundred copies from the Department, and gave them to persons who made inquiries regarding varieties for planting.

#### VEGETABLE EXHIBIT.

In response to my request, Mr. E. E. Adams of Leamington, our newly appointed experimenter in Vegetables, was in attendance, and showed a fine collection of vegetables for a first exhibit, which attracted much attention. Mr. Adams was present most of the week to answer questions. The complete list of his exhibit was as follows:

- Corn: Stowell's Evergreen (sweet).
- Corn: Early Ohio, Smut Nose, White, Yellow and Red Gourd Seed, Little Bailey, Leaming, Yellow Flint, all for field purposes.
- Corn: Queen's Golden and Rice for Popping.
- Celery: White Plume, Perfection Heartwell, Pearle le Grande, Winter Queen, Triumph.
- Cabbage: Late Drumhead.
- Carrot: Improved Short White, White Intermediate.
- Carrot: Chantenay, Danvers, Ox Heart.
- Citron: Green for preserving.
- Onion: Giant Rocca, Mammoth Silverskin, Large Red Wethersfield, Prizetaker, Giant of Gibraltar, Yellow Dutch Setts.
- Parsnip: Hollow Crown.
- Peppers: Long Cardinal, Procopp's Giant, Chinese Giant, Neapolitan, Cayenne.
- Squash: Red and Green Hubbard, Large Field.
- Potato: Gold Coin, Sensation, Rose of the North, Early Rose, Empire State, Beauty of Hebron, American Wonder.
- Potato: Yellow Nansemond (sweet).
- Water Melon: Halbert Honey.
- Pumpkin: Cashaw, New Winter Luxury, Small Sugar.

#### APPLES SHOWN BY SIMCOE STATION.

Of the fruit station exhibits Mr. G. C. Caston's attracted great attention, especially on account of his large pyramid of immense Wolf River apples, from his station in Simcoe County. One lady offered me \$1.00 for a single specimen, to send to Copenhagen, to show what apples we can produce in Ontario. I scured one for her without charge, after the fair closed.

Mr. Caston's Peerless apples were next in importance. This variety has been every year growing in favor with Mr. Caston; until now he speaks of it with considerable confidence as a desirable fall apple for export. It is productive, clean, uniform and beautiful; a seedling of the Duchess. His Gano, too, were especially good. Mr. Caston also rendered valuable assistance in attending at the table during the exhibition. His complete list was as follows:—

Boiken, Hulburt, Gano, Hastings, Blue Pearmain, Canada Red, Steele's Red Winter, Peerless, Baxter, Ribston, Cooper, Bottle Greening, York Imperial, Ontario, Salome, Grimes, N. W. Greening, Large Anis, Spy, Shiassee, Pipka, Aport, Shackelford, Winter Maiden's Blush, McIntosh, Greening, Ribston, Alexander, Golden Russet, Wolf River, Blenheim, Baldwin, Stark, Fallawater, Tolman, Fameuse, Ben Davis.



### THE BURLINGTON STATION EXHIBIT.

Mr. Peart showed a large collection of apples, many of them southern varieties of which the Board had sent him scions for testing on old trees. Most of these Mr. Peart reports as of little value for Ontario. He also showed a magnificent collection of currants, raspberries, blackberries and cherries in glass bottles, which attracted considerable notice. Another season, I would advise that shelves be put up for these in such a manner as to bring them near to the eye of the visitor.

At my request the varieties recommended for the Burlington district were shown in large pyramids. The following is a list of varieties shown:

APPLES: Nickajack, Minnesota, Malinda, Houseley's Winesap, Ozark, Highfile, W. C. Limberton, Gill's Red Winter, Bonum, S. Pearmain, Huntsman, Rebel, Gilbert, Wandering Spy, Kentucky Tolenstein, Spy, Baldwin, Greening, King, Seek, Holland Pippin, Esopus Spitzenberg, Blenheim, Golden Russet, Sox Russet, Snow, Swaar.

PEARS: Kieffer, Anjou, Clairgeau, Idaho, Louise, Lawrence, Sheldon.

### BOTTLED FRUITS.

*Blackberries*: Agawam, Ancient Briton, Eldorado, Erie, Kittatinny, Snyder, Stone's Hardy, Taylor, Western Triumph.

*Cherries*: English Morello, Montmorency, Windsor.

*Mulberry*: Russian.

*Currants*: Baldwin, Belle de St. Giles, Black Victoria, Boskop's Giant, Brayley, Champion, Cherry, Collins' Prolific, Crandall, Fay, Lee, Naple, New Victoria, North Star, Pomona, Prince Albert, Raby Castle, Red Cross, Red Dutch, Red Victoria, Saunders, Versailles, White Grape, White Imperial, Wilder.

Also 1 sample of choke-cherry.

### THE ST. LAWRENCE FRUIT STATION EXHIBIT.

Mr. Jones set up a valuable exhibit from his station. He has proved that a very long list of varieties of apples, pears, plums, cherries, and even some small fruits, sent him by our Board for testing, are not adapted for the St. Lawrence valley. A few varieties however succeed to perfection and these he showed in large pyramids, viz: Scarlet Pippin, Wealthy, McIntosh, Fameuse, and Milwaukee. This last variety Mr. Jones has had under favorable notice for some years as a promising commercial cooking apple, and every year becomes more confident that it is a desirable variety for his district. His complete list was as follows:—

PYRAMIDS: Fameuse, Scarlet Pippin, Baxter, Milwaukee, Tolman, Canada Red, Wealthy.

PLATES: Mann, Ben Davis, Golden Russet, Gano, Pewaukee, Pomme Grise, Yellow Bellflower, Downing's W. M. Blush, Blunt, Interacre, N. W. Greening, Aiken's Red, Parling Beautv, Romanstem, Canada Baldwin, Winter St. Lawrence, Clayton, Milding.

### THE ALGOMA STATION EXHIBIT.

Owing to the distance Mr. Charles Young could not come to assist in the setting up of his exhibit, but he sent on to us a box containing a good collection of varieties which had succeeded at his station on St. Joseph Island, where most of the commercial varieties of Southern Ontario are a failure. His list of varieties was as follows:

Pewaukee, Longfield, Winter Arabka, Golden Russet, Colvert, Wolf River, Scott's Winter, Borsdorf, Issam, Sour Seedling, Sweet Seedling, North Star, Gideon, Alexander, Wealthy, Ben Davis, and crabs Martha and Hyslop.

#### BAY OF QUINTE STATION.

Mr. W. H. Dempsey showed twenty-five varieties recommended for his district, out of perhaps one hundred and fifty, a large number of which he has proved unprofitable. Prominent in his pyramids were Stark, Fallawater, Ontario and Seek; varieties that have done wonderfully well in his orchards.

### EXHIBIT OF FRUIT EXPERIMENT STATIONS AT INDUSTRIAL EXHIBITION, 1906.

By P. W. HODGETTS, SECRETARY FRUIT GROWERS' ASSOCIATION.

In accordance with the order of the Board of Control, an exhibit was made at the Industrial Exhibition, not only of fruit as in past years, but also of the various tools used in the industry, samples of the chemicals used in spraying, together with mixtures already made up, devices for protecting trees from sun scald, rabbits, etc., and literature in connection with fruit growing.

The exhibit of fruit was made along the lines of the report of the stations as given in the bulletin on "Fruits recommended for planting in Ontario." While it was not possible to get all of the fruits, still, as far as possible, the recommended varieties were shown on the tables. For instance, in the varieties which are given as the most valuable ones for market as approved by the Board of Control, were shown, Astrachan, Duchess, Gravenstein, Wealthy, Alexander, McIntosh, Fameuse, Blenheim, King, Hubbardston, Greening, Baldwin, Spy, Ontario, Stark.

The same method was adopted in regard to the varieties specially adapted for home use, and also those for hardy districts. There was some trouble, however, in procuring samples of the latter varieties. The same method was followed out with the grapes, peaches, pears and plums. Placards were printed and placed along with the exhibits, giving the varieties and the purpose for which they were intended.

In reference to the fruits which were not in season, such as cherries, currants, raspberries, gooseberries and strawberries, a collection put up in glass by Mr. A. E. Sherrington of Walkerton was made use of as far as possible, while cards giving the full lists were placed with the exhibit.

In reference to the exhibit of tools, through the kindness of Rice Lewis & Son, Toronto, there were on the tables samples of the following:—

Distan Pruning Saw, Little Grant Pruning Saw, Ft. Water Pruning Hook, 17 S & J Pruning Saw, Douglas Saw, 50 Barrel Hatchet, Pair No. 2 Buckeye Pruners, Pair 134x10 Garden Shears, Budding Knife, Pruning Knife, Shears.

Samples of the various chemicals were exhibited, such as Paris green, arsenate of lead, copper sulphate, ferro-cyanide of potash, whale oil soap, flowers of sulphur, etc. These were again shown in bottles in liquid form, as mixed ready for putting on the trees. Paper and veneer coverings for the protection of tree trunks from various injuries, especially in the north, were also shown. Various types of nozzles and other important parts of spraying pumps were very kindly loaned by the various companies interested, and attracted considerable attention.



In regard to these exhibits for another year, I would suggest that those experimenters who are testing the fruits which are out of season at the time of the Industrial, be requested to put up samples this year of all the varieties as recommended by the Board, so that these will be available for this year's Exhibition. By the spending of a little additional money this year, I believe that even a better exhibit than that of 1906 can easily be shown. As the horticultural exhibits will be in one of the largest and most prominent buildings on the grounds, an extra effort should be put forth to make a banner exhibit during 1907.

In addition to the above, copies of the various reports of the Board of Control, the bulletin on "Varieties," Professor Hutt's bulletin on "Apple Culture," and the other fruit bulletins issued by the Department of Agriculture were displayed on the tables and freely distributed to those interested.

## REPORT OF THE INSPECTOR OF FRUIT EXPERIMENT STATIONS.

PROF. H. L. HUTT, O.A.C., GUELPH.

The past year has been one of progress and change in connection with the work of the Ontario Fruit Experiment Stations.

Since making my last report, much has been done which will more or less directly affect the continuance of the work at a number of the stations:

(1) The Government has accepted the property at Jordan Harbor so generously donated by Mr. M. F. Rittenhouse, and has now in hand the work of establishing a large fruit experiment station in the Central Niagara District.

(2) At our last meeting a recommendation was made to the Minister of Agriculture, and was, I believe, approved by him, that the stations eventually be reduced in number, retaining those at Trenton, Craighurst, Leamington, and the new one at Jordan Harbor; and that most of the other stations be given from one to two years to complete reports on the varieties now under test.

(3) A Fruit Experiment Station bulletin has been issued giving lists of varieties of fruits of various kinds recommended for planting in different sections of the Province. This bulletin contains in a condensed form the results to date of the variety testing done at the stations during the past ten years.

From this it might appear that the Stations, having accomplished the purpose for which they were established, had now practically completed their work. It must not be forgotten, however, that new varieties of fruits are constantly being introduced, and if we are to keep abreast of the times, the work of testing must be continued and these new varieties will have to be tested and reported upon as soon as possible. As an instance of this we need only refer to the recent introduction of the Spencer Seedless Apple. Here is a new variety of doubtful merit, as yet untried in Canada, being advertised over the length and breadth of the land and sold to Ontario growers at ten times the price of our best standard varieties. If we had no experiment stations for testing such novelties, there might be some excuse for growers generally spending their time and money on such things, but with reliable experimenters in various parts of the country, the general public can save much by looking to the experiment stations to do this testing.

In making my inspection of the stations this year, I have tried to keep in mind what has already been accomplished at the various stations, and to

note what may yet be done by them. In a general way the work of variety testing has been continued as in the past, and each experimenter should be able to report more or less fully upon the fruits he has had under test. These reports are of value, if they add some new information regarding the new varieties which may have fruited, or whether they merely confirm the results given in previous reports.

The weather conditions during the past season have been somewhat unusual, in many parts of the Province. Last winter was exceptionally mild, and fruit trees, as a rule, came through in good condition, although small fruits in the northern parts of the Province, where they usually have the protection of deep snows, suffered more or less from severe freezing when the ground was bare of snow. Last summer severe droughts prevailed in many sections, particularly in the northern and eastern parts of the Province, and for this reason the fruit crop in these sections was far below the average. In some localities as, for instance, in the neighborhood of Guelph, there was an abundance of rain throughout the season, and both early and late crops were excellent. These varied weather conditions will more or less affect the reports of experiments from the different parts of the Province.

Our strawberry experimenter, E. B. Stevenson, of Ponsonby, benefited by the favorable season in the neighborhood of Guelph, and had an exceptionally good crop of strawberries this year. He had over one hundred varieties under test, most of them new varieties not yet introduced to Canadian growers. He has a new plot of one hundred and fifty varieties set out last spring for fruiting next year. In view of the fact that Mr. Stevenson furnishes all his own plants, and that we merely pay him the small sum of fifty dollars for his excellent reports on them, I feel that we can hardly afford to discontinue receiving his reports after another year, as was proposed in the curtailing of the work of the various stations at our last meeting. Mr. Stevenson is doing this work for the love of it, and not for the small sum we pay him for his report, and it rests with us to say if his reports are not worth every year the small sum we pay for them.

In the neighborhood of Walkerton the drought last summer was unusually severe, and crops there suffered to a great extent. At the time of my visit in July to our experimenter, Mr. A. E. Sherrington, the raspberries in his experimental plots were drying on the bushes, consequently, he will not be able this year to furnish a satisfactory report on the varieties under test. It will be remembered that we recommended that two years more be given to complete the work on raspberries and the young orchard at this station. The young orchard in question contains about thirty varieties of apples and thirty-five of pears. The trees have been well taken care of and are just coming into bearing. It is quite evident that it will be impossible for Mr. Sherrington to furnish conclusive reports upon the varieties in this orchard in two years, and if we wish to get such results, we must be content to wait longer for them.

In the report recommending the curtailing of the work of the Stations, no mention was made whatever of the Station of Chas. Young at Richard's Landing, St. Joseph's Island, in Algoma. This station has been doing excellent work for the northern part of Ontario, and Mr. Young has under test a large collection of varieties of different kinds of fruits most likely to succeed in that northern section. The results which he has obtained so far show that with the selection of hardy varieties, fruit growing might be engaged in much more extensively in the northern sections of the Province. I think it is particularly advisable, for the benefit of the northern sections of the Province, that the work at this station should be continued.



The experimental plum orchard of Mr. John Mitchell, Clarksburg, suffered severely during the winter of 1904. The old trees in his original orchard have been nearly all killed. In the young orchard, which contained about fifty varieties, most of the trees still survive, but have been weakened in vitality and bore little or no crop this year, except on the American varieties. It might be well to await results of another year, after which the work at this Station might be discontinued. Mr. Mitchell is now manager of one of the largest co-operative fruit growers' associations in the Province, known as the Georgian Bay Fruit Growers, Limited, and, as his time will now be largely taken up in connection with the co-operative handling of the crop for that section, he will be very glad to be relieved of the experiment station work.

In Eastern Ontario, the drought was probably even more severe than in other parts of the Province, and the apple crop at our St. Lawrence station was the poorest I have seen there during the past ten years. Our experimenter, Mr. Harold Jones, has a young experimental orchard just nicely coming into bearing. He feels that his work will be far from complete at the end of one or two years, at which time it was proposed to close the work at his station. Rather than drop the work in an unfinished state, he has offered to furnish reports, without remuneration, until the varieties in his young orchard have been fully tested, and he has requested that the same be published for the benefit of those in his section.

The new station at Jordan Harbor is expected to take up, in time, the work now being done by the stations at Burlington, Winona, and Grimsby, but, as no planting has yet been done there, it will be several years before we need look for results at the new station. In the meantime, each of the older stations is in a position to furnish valuable information regarding a great many kinds of fruits, for at each of them are large plantations of fruits which have been under test for a number of years.

In concluding this report, I cannot help but refer to the many co-operative associations which have been organized all over the country during the last year or so for the purpose of handling and marketing the fruit crop. This development has largely been the outcome of the co-operative nature of the work of the Fruit Experiment Stations, and many of our experimenters are among the most actively engaged in the new movement. The benefit these organizations are going to be to the fruit industry can hardly yet be estimated, but we are safe in saying that they will many times repay all that has been expended upon the Fruit Experiment Stations.

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# Reports from the Experimenters.

## GENERAL NOTES.

By A. W. PEART, (*Burlington Station*).

Fruit growing this year has not given a large margin of profit. The winter of 1905-6 was a peculiar and extreme one in some respects. During January there were a few days of warm weather followed by several days of zero temperature. This sudden change, I think, accounts for the absence of plums and peaches in this district.

New plantations of fruit have not started very well. The season was hot and dry at the time of planting in the spring, and there are many gaps, especially among the strawberries and young cherry trees.

New wood appears to be going into winter fairly well ripened. The Tent Caterpillar was not troublesome, but there was considerable fall web worm.

The Canker Worm was not plentiful. Codling Moth was very destructive. There was very little fungus, apples and pears being comparatively clean.

Spraying is becoming more general and systematic. It is being realized that squirting a few quarts of water at a tree is of very little use, but that it is necessary to take pains in preparing the mixture, and spraying it finely and evenly throughout the tree. There are several power sprayers in the Burlington district.

APPLES were a fair crop of good quality. The Codling Moth reduced materially the amount available for export, but there was very little spot. A few odd apples had "ink" marks. In some narrow belts the hailstorm in summer practically eliminated No. 1 stock. Local markets, evaporators and cider mills, however, handled the surplus without waste.

PEARS were a good crop of excellent quality. As a rule they were smooth and clean. The Anjou and Lawrence were especially fine.

PLUMS were a complete failure, Japan as well as domestic varieties. The fruit-buds were probably destroyed by the sudden climatic changes in the winter.

PEACHES were also a failure, probably due to the same conditions.

CHERRIES were an excellent crop of good quality. Early Richmond, Montmorency, and English Morello were exceptionally fine. Spraying appears to be more effective against the troubles of the cherry than any other fruit.

GRAPES were a good crop of desirable quality. Moore's Early and Worden were eminently fine. There was practically no mildew nor black rot, and all varieties ripened.

BLACKBERRIES were a fair crop. All varieties bore more or less fruit. Prices ranged from 7 to 12c. per quart, according to quality and season.

RASPBERRIES were an average crop of good quality.

STRAWBERRIES were a shorter crop than usual and prices higher.

CURRENTS were a light crop. Prices were from 5 to 7c. a quart for red, and 8 to 10c. for black.

By HAROLD JONES, (*St. Lawrence Station*).

CHARACTER OF THE SEASON.—The winter of 1905-6 was in many ways one of the mildest known to the oldest inhabitant. There was very little



snow and that only in December, and some injury was done to trees and in many cases to the fruit buds by the very warm, spring-like weather of February, followed by the extreme cold in March.

Winter actually set in on November 30th, when plowing was stopped, the temperature going down to 5° F. On Dec. 4th, we had the first snow, 1½ inches falling, which gradually increased to five inches, which gave good sleighing up to January 21st, and from that time until spring the ground was practically bare of covering. The coldest night of the season was on February 5th, when the temperature was 21° below zero. The balance of February was springlike and bright, most of the frost coming out of the ground and the buds on the lilacs and other shrubs starting.

During March we experienced a dry cold month, with the frost gradually penetrating the ground to a depth of 22 inches, and very little moisture in the ground.

The result of this steady cold with no snow or moisture had the effect of injuring many fruit buds and killing out all strawberry beds and many flowering shrubs.

Spring opened on April 16th with the ground very dry, and the last frost recorded was on May 10th.

The plum trees suffered severely in bud, but were not killed. Apple trees came into bud very slowly, not opening until about May 13th, more than ten days later than normal. The continued cold weather through May retarded bloom until the last days of the month.

**INSECT LIFE.**—Insects were not numerous in the spring, but later on in July and August, as the result of very dry, sunny weather and high temperature, all insects multiplied to an alarming extent. The Tussock Moth has been giving some trouble for years, but this year there were no climatic conditions to control the insect and they caused severe damage to the apple crop, biting the young fruit and injuring its quality. The Codling Moth, owing to favorable climatic conditions, continued to multiply in continuous broods from spring to fall, instead of our having two distinct broods, as is usual in this section. As a consequence we may expect to have an unusual number of insects next year, the more so as parasites seemed very much in the minority, and there are egg clusters of nearly all kinds of injurious insects in unusually large numbers. I find that it is necessary to use larger quantities of Paris green with the early sprayings to control the Tussock Moth. They have the habit of eating the terminal growth of the suckers or tender shoots on the inner part of the tree, and also biting the young apple when about the size of a cherry. This deforms the mature fruit, lowering the grade to No. 3 or culls in most cases. For the two sprayings after the blossom falls 8 oz. of Paris green to the barrel of water or Bordeaux can be used with safety and to advantage, provided an excess of lime is used.

**CULTIVATION.**—For profitable results the system of cultivation must be maintained, but cultivation continued towards the end of the season has a tendency to produce a late succulent growth which goes into winter in an unripe condition. I have found the best results obtained by giving thorough cultivation from the time the ground can be first worked in the spring until about the last week in June, at which time a thick sowing of red clover—ten pounds or more to the acre—puts the trees in good condition for ripening up the new wood and hardening off the fruit beds. When the cultivation is continued through the season, the terminal growth goes into winter quarters in a green undeveloped condition, holding the leaves during most of the winter, and is often found shrivelled up and dead in the spring.

In fertilizing the orchard, aim to use a manure that is not too rich in nitrogen. When an excess of nitrogen is used you obtain a vigorous succulent growth that is easily injured, whereas if potash is the chief element, the growth is not so rapid, but the fruit bud is better and more fully developed and bursts in the spring full of stored-up energy and vigour.

By A. E. SHERRINGTON, (*Lake Huron Station*).

Owing to the warm, summer-like weather last January, considerable damage was done to fruit trees and bush fruits. In January the weather was so warm that the buds started into growth; then the temperature dropped to twenty below zero, practically killing all of the fruit buds and, in most cases, the leaf buds on the plum and all of the Duke and English cherries. This is the first case of the Japan plums being injured by winter frost. The plum crop here was a total failure. Morello cherries were a good crop, or would have been if the birds had let them alone. The apple crop has been very satisfactory, the fruit clean, medium in size, and all harvested and marketed at good prices, thanks to the co-operative movement. The yield of bush fruits was not equal to last year, being about one-third less; this was owing to winter conditions and the very dry summer.

The co-operative movement has done much towards the improvement of the fruit trade, especially in apples, as more apples and other fruit has been sold at the shipping point than heretofore; a more uniform grade and better pack having been the results of co-operation. This co-operative movement, if conducted along right lines, will in a short time place the fruit industry of this country on an equal with, if not superior to, the Dairy industry.

INSECTS AND FUNGI.—Not, in my experience, has the Codling Moth been so destructive as this season. A great loss has been sustained from the ravages of this pest. The past season teaches us that a more systematic cleaning up and spraying of the orchards of Ontario will have to be practiced before this troublesome insect is banished. Less fungi and apple spot was found this season than for many years; nearly all varieties were clean and free from scab.

Fire, or twig blight, was quite prevalent in some orchards; at this station a few pear trees in the Experimental plots were killed.

Very little planting was done at the station last spring, in fact no stock was furnished by the Department. All blanks, where trees had been killed or died, was filled in with the same variety, or in some cases new sorts were planted. A few new plums, pears, gooseberries and currants were added to the list by the manager. Considerable attention is being paid to top grafting, both in apples and pears, to ascertain if any improvement in hardiness, early bearing, or quality of fruit can be brought about by this method.

By J. G. MITCHELL, (*Georgian Bay Station*).

Taking it as a whole, this has been a very good year for the fruit growers of this district. Although PLUMS were a complete failure, and, for reasons not very well accounted for, APPLES, the main crop, were exceptionally good, very fine and clean and particularly well colored. Prices were about \$1 per barrel on the trees, or \$1.25 if picked. Many of the growers are taking the co-operative plan and handling them themselves, which is entirely the best way.



CHERRIES were also an abundant crop, of the very finest quality. Prices being well maintained, they were a very profitable crop. Small fruits are grown here for local requirements only, which was quite strong, still there was sufficient for all demands and the quality was very good.

FUNGI and INSECTS were very little in evidence this season, only the Codling Moth doing much damage, and this mostly in the uncultivated or unsprayed orchards. There has been a great deal more care of the orchards since the advent of co-operation. Growers are finding that the orchard, if properly managed, is the best investment they have, and will pay the largest dividend on the time and labor expended.

By G. C. CASTON, (*Simcoe Station*).

Many of the apple trees in this section, my own included, are seriously affected with Oyster Shell Bark Louse. I intend to try the lime whitewash, but I have more faith in a thorough scrubbing with lye. The whitewash is an easier method, if it is only as effectual.

I think a trial should be made of arsenite of lead at the stations as a poison for Codling Moth and leaf-eating insects. Something that will stick better than Paris green is needed to be effective against these pests, especially in a rainy season.

By J. L. HILBORN, (*Southwestern Station*).

Some EARLY RICHMOND CHERRIES are grown here, and, as usual, were a fairly good crop but owing to the rainy weather at the time the fruit was ripening, it was soft and juicy and did not ship well. Much complaint was received from receivers of this fruit that it arrived in a wasty condition, and would not stand up. This variety is not very satisfactory either to the grower, dealer or consumer. The MONTMORENCY is an excellent variety here and yields a good crop almost every year, and is very satisfactory to all, but the leaf spot has been very bad on all varieties of sour cherries the last few years, and unless some remedy is found to check it, serious results to this crop are imminent. SWEET CHERRIES of nearly all varieties were an excellent crop and ripened up in good condition.

By C. CHAPMAN, JUDGE, ONT., (*New Ontario*).

I have received the following list of trees for testing in this locality, viz.: APPLES, Transparent, Astracan, Duchess, McIntosh, Charlamoff, Wealthy, Gideon, Transcendant, Hibernial, Hyslop, Whitney, Martha.

PLUMS: Burbank, Chabot, Red June, Hawkeye, Stoddart, Wolf.

These trees are doing well, and looked well at the beginning of the winter. I have wrapped them with tar paper to keep the mice away. I am doing everything I can to make them succeed, and I think they will. A lecturer from the O. A. C. has seen my fruit plot and says I have the best object lesson fruit planting in Northern Ontario. The small fruits have not done so well, but dried up a good deal in arrival, through delay in transportation.

## APPLES.

NOTES BY W. H. DEMPSEY, (*Bay of Quinte Station*).

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The apple crop has been very disappointing again this year. The crop being so light last year, the growers were counting on a heavy crop this year, and were still holding out hope when the trees came into bloom, as the amount of bloom was not very heavy, which in the past has been an indication of a fair crop; but the bloom dropped and the embryo fruit also, leaving a very meagre crop of fruit to be still further thinned out by the ravenous worms and insects. Probably the most destructive of the evils were the Codling Moth and the Fungus, while in a few localities the Apple Maggot was also very destructive, commencing on the early varieties such as Astrachan, Duchess, Wealthy, and on down through the winter varieties, leaving its mark of destruction as the varieties came into condition for it. These attacks caused the fruit to color prematurely and fall to the ground. Some growers were under the impression that the fruit was ripening on account of dry weather, but when carefully inspected, the cause was discovered. I think the loss to some orchardists from it alone would be fully 50 per cent. of the crop.

The only remedy I know of is to gather the fruit and destroy it.

Where the grower did not follow up careful spraying the trees suffered very severely from the Oyster-shell Bark-louse, which seemed to find the weather conditions most favorable for it. Many young orchards will be almost worthless from the effects of it.

Where trees were grown very rapidly, making a somewhat spongy growth, the Fire Blight appeared, causing a goodly portion of the foliage and young growth to die.

Ink Spot helped materially in supplying apples for the evaporators, probably more conspicuous on Greening and Tolman. Apple spot was very bad in uncared-for orchards on Snows.

The man who takes pride in his orchard and thoroughly sprays and cultivates it, does a great work in maintaining the name for Canadian apples, and should have all the assistance that can be given him. This has been brought more to my notice this season through the co-operative work that I have been connected with. In such instances it was possible to ship 90 per cent. of the apples; where not specially cared for less than 50 per cent. could be exported on account of fungi, Codling Moth, Curculio bites, which caused the apple to be irregular in shape and very poor even for the evaporator or canning factory.

Probably the only remedy for this condition is the co-operative company for handling these products, where each grower gets pay for just such fruit as he produces. If he grows number one, he gets number one pay; while if content to grow a large per cent. of No. 2 and culls, his income will be accordingly low. This can never be remedied by the so-called apple buyer who buys by the lump, good, bad, or indifferent; the pay is the same for all. But the evil does not stop here; the buyer is going to try and make a large percentage of No. 1's out of those and escape the Government inspectors if he can, and get them on the foreign market and destroy the demand for the good, honest, straightforward packs that are being put up by the careful growers and co-operative associations.

We notice these unscrupulous buyers trying this more and more every day, putting on grade marks of A, B, C, in place of Nos. 1, 2, and 3,



pretending they are shipping locally to have them repacked in U.S.A. before going forward; but fortunately very few have got past our wide-awake inspectors in this way.

It is pleasing to note the number of fine orchards in the most choice locations, as a rule with natural drainage, which have been carefully pruned and cultivated, while a few orchards that were planted in very unsuitable locations simply because it was more convenient to the buildings, are in an unhealthy condition, having cold, wet sub-soil water standing on the surface until late in spring. One of the greatest drawbacks in this district is the poor choice of varieties the growers have made for their particular locations; for example, the Jonathan, an excellent dessert apple, but far too small for profit, averaging about two inches in diameter.

One orchard had fully one hundred barrels of Golden Sweet; it was impossible to market them in the short time that they were in prime condition.

MANN is not very productive; the trees sun scald badly, making an unsightly appearance alongside of other good varieties. ST. LAWRENCE fruits heavily but very little of the fruit is perfect, making a small percentage of No. 1's and is seemingly not wanted in foreign markets; besides I notice many other varieties that are not suitable for these locations.

SPY seems to be doing well in nearly all the orchards.

GOLDEN RUSSET is not doing well except in a few orchards; it seems to require special location and conditions. The best I saw was on a point running out in the Bay of Quinte, exposed to the heavy winds. The soil is a clay loam, the fruit was very large, rich golden in color and showing a large percentage of No. 1.

BEN DAVIS was found in every orchard but is not a success in all; but I think it comes the nearest to being a success in every location of any variety. The locations where it was not doing well was apparently a cold and wet subsoil, where frost comes early in fall and late in spring, or on very dry gravel but where little moisture is maintained during the growing season.

The other varieties similar to Ben Davis, such as Cooper's Market and Gano, averaged far too small to be of any value compared to the former and seemed to be more subject to the different diseases common to the apple.

CRANBERRY: In a few locations that seemed suitable, this variety gave remarkably fine crops this season and sold very readily at good prices; but in other locations I found old trees that have never done anything.

BLENHEIM: Seems to be another variety that needs a special location to be profitable. I only found one block of them that did anything this season and that was on top of a high hill, soil a clay loam apparently no different from any other except it gave the finest fruit to be found in this locality.

TOLMAN SWEET: Seemed to be in all the older orchards and fairly well loaded, but fully 90 per cent. of the fruit was defective on account of the many insects and fungi affecting it. I have had great difficulty in disposing of them at fair prices, although they are the best all round sweet apple that I know of.

BALDWIN: This is a variety that has not been so largely planted as one would expect, and, like the Cranberry, seems to require a special location to be profitable. In a few orchards the ESOPUS SPITZENBURGH was doing remarkably well, bearing a good crop for the season of that good old rich high quality apple brings good prices in the markets. It would certainly pay the grower, where they can grow it successfully, to plant more of it and less of the poorer kinds.

In Rawdon Township I found several orchards of that beautiful apple the MCINTOSH RED, which are certainly very profitable; the fruit was of very large size, high color, and equal to any I ever tasted in quality, which sold at good prices, also the FAMEUSE (SNOW) were equally good in the same orchards.

There was one small block of BAXTER that was fairly well loaded with large, highly colored fruit, but when packed nearly half of the bulk had to go to the evaporator on account of fungi and Codling Moth.

KING seems to be one that will not pay; I find it in the most favored locations and yet without fruit. I only had about thirty barrels in the twelve thousand handled this year, which is extremely small for the number of trees.

GREENING in many orchards bore well, but the fruit in some sections was badly infested with ink spot which made it only fit for the evaporator; in other orchards it was practically clear and sold at a good price for this year.

What few trees of GRAVENSTEIN I saw were fine; it is one of the fall apples that has been neglected; not planted as largely as it deserves, being of high quality and productive each alternate year.

There were a very few small blocks of LONGFIELD; it was a great mistake that they were ever introduced into this section; the tree is a very slow grower on account of its fruiting heavily; the fruit is small, more like crab-apples, too small for the evaporator and of very poor quality; unless heavily thinned it is not worth growing in this section.

FALLAWATER: Not very many trees grown, only found in a few orchards, and as a rule the tree shows sun scald and unhealthy conditions. It produced a fair amount of fruit which was badly infested with Codling Moth and Fungus. Many medium sized apples turn a bright lemon yellow color that were green when picked, but become mellow and punky after being in the storage for a month, causing a great waste. I would not recommend planting it with the idea of shipping it for the winter markets.

NONSUCH was doing fine wherever it had any chance, and sold at good prices; it requires to be picked early and, like the Cranberry, it falls to the ground early.

DUCHESS were very fine in nearly all locations and sold for good prices; it paid the grower well.

WEALTHY as a rule ran very small on account of overloading, making probably one-half not fit for shipping; it would pay well if the growers were to thin it, taking off one-half the crop when the fruit is half grown; the balance would increase in size enough to make the same number of barrels.

The crop of apples in the experimental orchard was a failure.

AIKENS RED: Only two apples, but the crop of 1905 kept well and were very fine in March; it is of medium size, bright red, and of good quality.

BANANA: Bore a few apples which were bright as usual; the fruit of 1905 was in good condition in March, and of good quality.

COO'S RIVER: One apple; the fruit of last year kept very good through January in the fruit house, but did not retain its quality.

MILDING: Still making vigorous growth but no apples.

SUTTON'S BEAUTY: Is making very slight growth: unhealthy in appearance; very few apples; fruit of 1905 did not keep well later than January; quality no better than Baldwin.

YORK IMPERIAL: Not fruiting; 1905 apples were in good condition in April: think it would take well on the markets, but it has not been very productive either top grafted or in trees.



WINTER MAIDEN'S BLUSH: Very few apples; the fruit of 1905 did not keep through January and was of medium quality.

The fruit buds of the cherries, plums and peaches were all winter killed, therefore no specimens this year. Trees all in fairly good condition except peaches, which were frozen back.

NOTES BY HAROLD JONES, (*St. Lawrence Station*).

The following notes are on varieties not reported in 1904-5:

AIKEN'S RED: Planted 1897; tree fairly hardy; a wide, spreading grower; dark green foliage; fruit, small, dull red, of fair quality, but subject to spot; not desirable.

BLUNT: Planted 1897; a round, compact, vigorous, healthy tree; hardy, ripening its wood well; fruit, large, 3 to 3½ inches, yellow, striped and splashed with red; a nice looking apple, not prolific as yet.

BOIKEN: Planted 1897; fairly hardy and vigorous, but has not proved of any value yet.

CANADA BALDWIN: Planted 1896; continues to show great vigor and hardiness, but comes into bearing slowly. If this tree proves prolific, it will be valuable for this section, as the coloring is very high, and it is an attractive apple on the market.

CLAYTON: Planted 1897. This tree is not vigorous, and its fruit shows no desirable qualities.

DOWNING'S W. M. BLUSH: Planted 1896; tree vigorous, upright, but does not ripen off its wood well; fruit, medium to large, waxy white, with blush similar to Fall Maiden's Blush.

FANNIE: Planted 1897; tree upright, slow grower, injured to some extent every winter, not hardy.

GANO: Planted 1900; tree and growth similar to Ben Davis; fairly hardy, but shows some injury to terminals; fruit very highly colored and very attractive; worth further trial.

HURLBUT: Planted 1896; a fairly hardy, vigorous tree, but fruit of no value; undesirable in this section.

MILWAUKEE: Planted 1896; this tree maintains its many desirable qualities. It has been giving me annual crops since 1901, and has come through the severe winters just passed without any injury whatever. The fruit is green, splashed with dull red at harvest time, but later takes on a bright yellow and brilliant red in the storehouse; a prime favorite as a cooking apple all winter, keeping well through March. I consider this apple a valuable addition to our limited supply of winter fruit, and it will no doubt be largely planted when its qualities become better known. Can be classed as desirable.

MAGOG RED: Planted 1896; tree an upright, moderate grower; fruit undersized for the variety and poorly colored; not desirable here.

MILDING: Planted 1897; a spreading, fairly vigorous tree, hardy; fruit medium to large; promising.

N. W. GREENING: Planted 1896; tree fairly vigorous, forming a round, compact head; fairly hardy, but not ripening its wood well at the tips; fruit dull green, sometimes with faint blush; uneven in size, running from small to very large; of fair quality, but unattractive in appearance; of no special value.

PARLING BEAUTY: Planted 1898; tree vigorous and hardy, forming a close, compact head; fruit large and handsome; worth further trial.

ROMANSTEM: Planted 1898; a close, compact tree, with slender twig; fruit of poor, undesirable appearance and quality; of no use in this section.

SALOME: Planted 1896; tree hardy, compact, round close head; fruit small, undeveloped and poor in quality; not desirable.

SWITZER: Planted 1897; a hardy, vigorous tree, coming into bearing early; season about the same as Duchess, and of no value compared with that variety.

SHACKLEFORD: Planted 1897; tree of only moderate vigor; fruit small, poorly colored and greasy; not desirable.

WOLF RIVER: Planted 1896; a hardy, vigorous tree, of promise; a fair crop of large to very large, handsome apples; an apple that extends the season of the Alexander, and one that sells well on the market; a good show apple and in demand for decorating shop windows; hardy and promising.

WINTER ST. LAWRENCE: Planted 1896; tree a vigorous, healthy grower; comes into bearing slowly; fruit medium to large; attractive and promising.

WINDSOR CHIEF: Planted 1896; tree of poor vigor and injured to some extent by frost; not very promising.

Desirable varieties for St. Lawrence Valley, according to season:—Yellow Transparent, Brockville Beauty, Russell, Duchess, Chenango, Alexander, Wolf River, Wealthy, Scarlet Pippin, Fameuse, McIntosh, Baxter, Canada Baldwin, Blue Pearman, Milwaukee, Golden Russet, Scott's Winter. The following varieties are not recommended:

Aikens' Red, Blenheim Pippin, Betchel's Crab, Clayton, Downing's W. M. Blush, Dartmouth Crab, Fannie, Gideon, Hamilton, Hurlbut, Hibernial, King, Longfield, Late Strawberry, Mann, Magog Red, Mammoth Black Twig, N. W. Greening, Ontario, Onion Crab, Palouse, Roman Stem, Salome, Sutton's Beauty, Shackleford, Waxon Crab, Winesap, Yate's Red.

#### NOTES BY A. W. PEART, (*Burlington Station*).

In 1901, thirty-nine varieties of Southern State apples were sent here in the form of scions. These were top-grafted on four trees of Roxbury Russet. Six varieties failed to grow, and of the remainder, twenty-six varieties bore fruit this year, as follows:—

BELMONT: Apple small to medium in size, roundish flat; yellow; stem medium length, cavities shallow; flavor sub-acid, moderately juicy; no spots; some Codling Moth; fair looking; season, early winter. Yield, 6 qts.

BONUM: Very small; red; stem long, cavities shallow; oblong-round; sub-acid; no spots nor worm holes; very few apples. Season, late winter.

COFFET: Small; yellowish-red; short stem; roundish-flat; sub-acid; very few apples; no spots; wormy; poor looking; late winter.

CULLESAGO: Small; sooty yellow; long stem, medium cavity; sub-acid; wormy; no spots; poor looking; very few apples; season, early winter.

GILL'S BEAUTY: Red, slightly tinged with yellow; small; roundish; long stem, shallow cavity; skin fine-grained, flavor sub-acid; no spots; very few worms; rather a good looking apple; season, mid-winter; few apples.

GILBERT: Small; round; yellowish-red; long stem; sub-acid; wormy; no spots; very few apples; not attractive looking; season, late winter.

HATCHELL'S SEEDLING: Very small; dark red; roundish conical; medium skin; sub-acid; very few apples; season, late winter.

HUNTSMAN: Medium size (about that of Baldwin); roundish-flat; slight-



ly ribbed; very yellow skin, slightly mantled with crimson; medium cavity; stem medium length; flavor, sub-acid; rather handsome apple; no spots; some worms; very few apples; season, mid-winter.

**HANSELEY'S WINESAP:** Small; roundish conical; medium stem, medium cavity; red; sub-acid; spongy; neither worms nor spots; yield, 36 quarts; good-looking; season early to mid-winter; clings tenaciously.

**HIGHFILE:** Small to medium; roundish conical; short stem; dark red, covered with rich purple bloom on the sunny side, like that of the black grape; very attractive and handsome; drops rather easily; flavor, sub-acid; no spots; a few worms; season, early winter; yield, 18 quarts; a promising variety.

**KENTUCKY TOLENSTEIN:** Medium to large; roundish-flat; yellow striped with bright red; slightly ribbed; long stem; cavity medium; sub-acid, pleasant flavor; no spots; no worms; only a few apples; a striking, attractive looking apple; season, mid-winter.

**L. S. PEARMAIN:** Flat; small to medium; short stem; yellowish red; sub-acid; medium cavity; some spots and worms; yield, 6 quarts; season, mid-winter.

**LITTLE'S RED WINTER:** Small; roundish flat; long stem; red, marked with slight yellow; medium cavity; sour; juicy; some worms and spots; few apples; fair looking; season, early winter.

**MINNESOTA PIPPIN:** Small; oblong-round; very short stem; yellowish red; sour; some juice; no worms; some spots; yield, 24 quarts; season, early winter.

**MAMMOTH PIPPIN:** Small to medium; yellow; sub-acid; cavity medium; short stem; fine-grained skin; few worms; no spots; very few apples; season, early winter.

**MILAM:** Small; yellowish red; medium stem; moderate cavity; roundish flat; sub-acid; no spots nor worms; very few apples; late winter.

**MALINDA:** Very small; dull red; cavity medium; medium stem; round; sub-acid; few apples; season, late winter.

**NICKAJACK:** Medium size; roundish flat; red, mottled with yellow; cavity moderate; stem medium; sub-acid; few worms and spots; yield, 6 quarts; fair looking apple; late winter.

**OZARK:** Small to medium; rich, dark red color; stem medium; cavity moderate; skin fine in grain; roundish conical; sub-acid; some worms and a few spots; a handsome apple; yield, 1½ bushels. This apples hangs very tenaciously, and this year promises well; season, mid-winter.

**PENNSYLVANIA RED STREAK:** Small; yellow, striped with red; short stem; sub-acid; roundish flat; some worms; no spots; few apples; season, early winter.

**RED LIMBERTWIG:** Small; greenish red; oblong; medium stem; shallow cavity; sub-acid; some spots and worms; yield, 12 quarts; unattractive looking; season, mid-winter.

**REBEL:** Small to medium; roundish flat; yellowish red; long stem; moderate cavity; sour; juicy; some worms and spots; few apples; good looking; season, early winter.

**WANDERING SPY:** Medium to large; red; cavity deep; stem medium; roundish; sub-acid, pleasant; small core; no spots; very wormy; rather good looking; yield, 3 quarts; season, late winter.

**W. C. LIMBERTWIG:** Small; roundish conical; reddish yellow; stem long; cavity shallow; sub-acid; a few spots and worms; fair looking; yield, 7 quarts; season, mid-winter.

**YELLOW HORSE:** Medium to large; smoky-yellow; roundish flat; slightly ribbed; cavity very shallow (almost like Pewaukee in that respect); very short stem; drops badly; sub-acid; juicy; good flavor; not attractive looking; few apples; season, early winter.

Of the above varieties the only ones that were promising are the Ozark, Highfile, Hansley's Winesap, and Kentucky Tolenstein, the Ozark being the most so of any.

All of the apples appear to be hardy, and most of them of a sub-acid flavor and lacking in juice. At the present time (Nov. 26th), all seem to be winter varieties.

NOTES BY G. C. CASTON, (*Simcoe Station*).

There is comparatively little to report that is new this year; but some notes on varieties that have been under test for some time may prove interesting and valuable to those who intend planting fruit in this district. There was nothing received for planting here this season except a new variety of raspberry called the Eaton, which is referred to elsewhere. The apple crop was very irregular in this locality and lacked uniformity. Some orchards were fairly well laden, while others were almost barren. This irregularity applied to all varieties of winter apples, rather than early kinds, as Duchess and most varieties of fall apples were fairly good. All kinds of apples were cleaner than usual, even Snows were much freer from fungus scab than they usually are.

Notes on varieties of Apples:

**SPY:** The king of all the winter apples; the most saleable of all apples in the home market. I would say to all intending planters, plant hardy, healthy, thrifty-growing trees, and top-graft them with Spy. When they come into bearing you will have an apple that will never go begging for a market. This is the advice I gave twenty years ago, and I would emphasize it to-day. I have them doing well on Yellow Transparent, on Haas, on Wealthy, on a dozen varieties of Russian, on Pewaukee, and on Tolman Sweet. I would recommend the latter especially as a stock for top-working Spy on. The most unsuccessful I have tried are Astrachan and Russet. Do not use them when better ones are available. But to grow fancy Spys, top-grafting is not all of it. Regular pruning, cultivation, spraying and feeding with proper manure, are all essential. But the more fine Spys you have the better you can sell, and the more money you will get. They always help to sell your other apples. The Spy is a good investment.

**BALDWIN:** I am growing this apple top-grafted on Russian and other stock. I don't believe it will ever do as well as the Spy here, even top-grafted. The extremely cold winter of 1903-4 gave some of them a severe set-back, while top-worked Spys were unscathed. However, they are coming along nicely now, and some of them are beginning to bear, but I believe a few years' further test will indicate fairly well just how well the Baldwin will do here top-worked on hardy stock.

**KING:** Does it pay to grow Kings anywhere? I doubt it. While top-grafting improves its bearing, making it more productive, yet it is hopelessly discounted by the Spy in bearing.

**GREENING:** Does well top-grafted, and this good old variety has not lost its popularity, and is not likely to as long as it can be grown of good quality. And that is simply a question of top-grafting, spraying, pruning and proper tillage in this locality.



GAÑO: I still like this variety better than Ben Davis, to which it is no doubt closely related, although in my estimation a much better apple.

There are two varieties of winter apples not much noticed in any former report, that I think now to be well worthy of consideration. One is Steele's Red Winter. This would be a good substitute for the Baldwin where that variety cannot be grown, as it is quite hardy, and while not of high quality, it is a good shipper, and will keep till June. The other is the old "Seek," which does fairly well here, and will do exceedingly well when top-grafted, and is a very saleable apple of good quality.

YORK IMPERIAL: This is one of the new varieties that are promising. It has borne a few specimens this year, and promises to be a useful winter variety. If it should prove to be desirable as a good market apple, it should be top-grafted, as the tree is tender.

BOIKEN: I am still pleased with this variety. It is sure to be a profitable kind, as the trees started to bear two years after planting, and have borne regularly ever since. The tree is fairly hardy and the apple is a good shipper, and will keep as long as Ben Davis. The quality is only fair, but its keeping and shipping qualities, coupled with its early and regular bearing, would commend it.

SHACKLEFORD: I see that Mr. Dempsey places this one on the list of undesirable varieties. I will not do that yet, but designate it as promising here, and worthy of further trial.

MCINTOSH: This cannot be said to be a success here. It does not bear regularly, and it is one of the worst varieties for scab, worse, even, than Snows.

SHIAWASEE BEAUTY: I regard this variety as the best of the progeny of the Snow, and will prove an excellent substitute for that variety. About the same season as the Snow, it bears well; the fruit is clean and much larger, and although it has not the Snow flavor so distinctly as Louise or the McIntosh, yet it is an excellent Christmas dessert apple. I think, as it has had several years' trial, it is safe to recommend it to intending planters as an excellent substitute for the Snow.

WOLF RIVER: This is going to prove a profitable apple for this section. A very healthy, thrifty, hardy tree, bears early, a good yielder. Fruit very large, but smooth, clean, and takes on a beautiful color, and is an excellent cooker. The fact that I intend planting a number of trees of this variety in the commercial orchard indicates what I think of it.

CANADA BALDWIN: This variety fruited a few specimens this year. I would call it promising, but it needs further trial.

Two Russian varieties fruited this year which might prove useful for localities farther north, as they are hardy. One called LARGE ANIS is of the Alexander type, but later; the other, PIPKA APORT, is above medium size, flat in shape, skin dark green, overspread when ripe with dark red, and would keep till midwinter. They are not recommended for this section, as there are many varieties of the same season and of better quality growing here.

NORTH-WEST GREENING: A promising variety; needs further trial.

PEERLESS: A seedling of Duchess, and one of the very best cooking apples on the list. A clean, handsome apple. Season, September-October.

MARTHA: In Crab apples, I have fruited a dozen more varieties, and my preference is for the Martha. Good for culinary purposes and clean, bright, handsome in color.

NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

As stated in general notes, apples were a very satisfactory crop, and with the exception of the Codling Moth, the crop was harvested and disposed of at good prices. The only difficulty in this District, as no doubt in all others, we have too many undesirable varieties for successful apple culture. The crop at the Station was a very heavy one, quality good, a few more of the new varieties fruited this season.

BISMARCK gave a barrel per tree; this variety is of the Alexander type, but a better keeper.

NORTHWESTERN GREENING, about one barrel per tree, of large well formed apples, but the quality is rather poor, color green, undesirable for market, either home or foreign. Tree vigorous and hardy.

STARR, fruited for the first time; fruit large, resembles Colvert, but quality much better, season a little earlier.

SHACKLEFORD, produced a few samples of fine appearance; tree vigorous, and hardy, but the quality of the fruit is too low for it to ever become a profitable market variety.

STARK, fruited for the first time; fruit large, resembles Colvert, but hardy, and an early bearer, but the fruit is not equal in color to the Ben Davis, quality about the same.

None of the newer sorts are equal to the old standard varieties, and in my opinion, if we had more of such varieties as the Baldwin, Spy, King, and a few others, it would mean thousands of dollars to this country.

The trees top grafted are all doing well, and some interesting information may be looked for in course of time.

NOTES BY J. G. MITCHELL, (*Georgian Bay Station*).

This has been a very good season for apples, and we have had a great many varieties in bearing. So far as this district is concerned, there are none of the new varieties which can displace the best of the old well tried kinds.

As experimenter, and having had thirty years growing apples, also buying and handling in a large way, I have often been asked to recommend what to plant. Location and conditions are so different in even a limited area that it is scarcely safe to advise. For my own planting in commercial orchard I would use the following: Gravenstein, Baldwin, Spy, and Mann, with a few Ben Davis. The last four are the long keepers, and the real money makers of the orchard. Not only do they sell for the highest prices, but they bear enormous crops which many others of fairly good quality seldom do.

NOTES BY CHAS. YOUNG, (*Algoma Fruit Station*).

The past season, including the winter of '05-'06, has been peculiar in one respect; in everything, except plums, the show of blossom in the spring was good; with the exception of a frost after the buds began to swell the weather for setting fruit was favorable. About the usual proportion of fruit set, but began to drop and continued so through the season. Fall fruit was a full crop, but winter fruit was poor in quantity, although the quality was good. We are still looking for that first class winter apple, but it has not turned up yet. The old saying that Hope deferred maketh the heart sick, does not hold good in our case, but acts as a spur to further exertions,



and the want of a so-called winter apple is not so great a want after all as it might appear to those in the most favored fruit sections. When I state the fact that on the 26th day of March, 1906, we finished the last barrel of Alexanders in perfect condition for dessert and of a finer texture and better quality than those grown in the south, you will see that, even if we have to depend on ourselves, we are not so badly off after all. Since I commenced fruit-growing in Algoma, 23 years ago, I have made several mistakes. Knowing this to be a cold country in winter, I located my orchard in what I considered a nice sheltered valley on naturally dry soil; that was my first mistake. The next was planting varieties that we have since found to be useless here. About that time the tree agent came round and often, to get him out of the house, I would purchase a few trees; by and by the little sheltered hollow was filled up and the trees were planted on higher ground. They did, and have continued to do so, very much better on the high ground, that I have always advised planting on the highest ground, without actually selecting a hill top. Another mistake was planting a wind break; it was all right for a few years, but now the spruce, of which it was composed, are 40 feet high, and are destroying the rows of fruit trees next to them. A wind break is desirable, but should be kept well away from the fruit trees. Another mistake, which it took several years to be convinced, was the idea that by working a tender variety on a hardy stock that the top would be sufficiently hardy to endure the frost in winter; this I am now satisfied is not the case. A Baldwin top on a McMahon stock remains a Baldwin top still and no hardier than on its own root as far as a frost resisting power is concerned. This good may result,—a trunk, liable to sun scald, may be made better by working on a hardy stock. Another mistake, it is quite possible to have the ground too rich in nitrogen in a young growing orchard; a long sappy growth is the result with wood not fully matured before winter, which is absolutely necessary in a cold climate. I have lost several trees from this cause. I have about forty varieties of winter apples top grafted principally on Longfield, mostly Russians, doing nicely, besides some local seedlings. We may get something out of them.

I would like the Board to send me scions of Milwaukee, Boiken and Peerless for top grafting. I would also like to try again Spy and Ontario. These last, although frozen out in the winter of 1893-4, I am not satisfied to discard. If the Ontario does freeze down once in twenty or twenty-five years, it bears so early, and has, until this winter, been so satisfactory, that I find nothing to take its place. I propose top working it on McMahon or Longfield stock. I also want to try the Herbert Raspberry.

From your long experience in the Niagara district you know just what varieties bring the most money per tree, but here we are just finding this out. An immense quantity of apples were shipped from the dock here last fall at prices of \$2.25 to \$2.50, buyers finding the packages and paying freight, 11 qt. baskets of Astrachan and Duchess Transparent at 25c. to 35c., including basket.

Between what was put on last spring and this spring I will have about 100 varieties, all coming on together, which will give me a better opportunity of observing the individual behavior of each than if the work was spread over a long series of years.

I have delayed replying to your letter for this reason: For some years, on the 20th day of March, I have sampled apples kept over winter just to find out their keeping qualities: they have all kept in an ordinary cool cellar under the house; the fruit was not selected, only no apple showing bruise was allowed; the following are a few results that may interest you:

ALEXANDER: Past its best for eating, still fit for cooking.

WOLF RIVER: Very good eating, will possibly keep nearly a month longer.

GOLDEN RUSSET: Skin all shrivelled up, slack in the package, not satisfactory, do not think this apple matures sufficiently.

MCINTOSH: Good up until the end of February, slightly past its best now.

PRINCESS LOUISE: A most satisfactory apple every way, in fine condition now, this should be added to our list for Algoma.

SNOW: Past its best, 50 per cent. decayed.

LONGFIELD: All good, but the apple is too small for market.

SCOTT'S WINTER: Will keep for months yet, but too small; not profitable to grow.

GIDEON: 4 per cent. rotten at the core, past its best.

SWITZER: Nearly all gone; no use to keep over.

These are a few of the principal kinds grown here, and this report may interest you in regard to their keeping qualities when grown in the north.

A select list of varieties of apples for cooking in the Algoma District, named in order of ripening: Yellow Transparent, Charlamoff, White Astracan, Red Astrachan, Duchess, Oriel, Basil the Great, Alexander, Wolf River, North Star, St. Lawrence, Wealthy, Gideon, McIntosh.

Late Winter: Scott's Winter, Golden Russet, Arabka, Baxter, Pewaukee, Princess Louise, a winter apple here. To this may be added Milwaukee and Northwest Greening, but I have not fully tested them yet.

A list of varieties of apples not considered worth further cultivation in the district represented by the Algoma Fruit Station: Spy, King, Baldwin, Tolman, Blenheim Orange, Rolf, Sweet Bough, Ben Davis, Stark, Bismarck, Mann, Rhode Island Greening, Fourth of July, Early Harvest, Lady.

### UNDESIRABLE FRUITS.

In addition to the list of apples enclosed, and taking a commercial view only, I would include all Grapes, Pears, and Blackberries. For these the general market will have to depend on a supply from further south. To a limited extent or for private use a few of each may be grown. There is always a certain amount of pleasure, not to be counted by dollars and cents, in growing your own fruit for your own table.

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### BLACKBERRIES.

NOTES BY A. W. PEART, (*Burlington Station*).

To the UNDESIRABLE VARIETIES reported in 1904 the two following ones are also added:—Early King, as being too tender, and Humboldt, as being too small as well as tender.

The HARDY VARIETIES are Agawam, Ancient Briton, Eldorado, Stone's Hardy, Taylor, Snyder, Western Triumph, Wachussetts.

COMMERCIAL LIST: Ancient Briton, Agawam, Snyder, Taylor, Western Triumph.



**AGAWAM:** Cane, dark red, vigorous, upright grower, hardy and productive; berry roundish, oblong, medium size; first and last ripe, July 31-Aug. 20; yield per row, 18 feet, 6 quarts.

**ANCIENT BRITON:** Cane, dark red, moderately vigorous, upright, hardy and productive; berry oblong, conical, medium size; first and last ripe, July 28-Aug. 15; yield, 18 feet row,  $7\frac{1}{2}$  qts.

**ELDORADO:** Cane, brownish red, upright, spreading, medium vigor, hardy and fairly productive; berry medium to large oblong, conical; first and last ripe, July 31-Aug. 20; yield, 18 feet,  $4\frac{1}{2}$  quarts.

**ERIE:** Cane, greenish red, moderately vigorous, spreading, slightly tender but productive; berry medium to large, roundish, conical; season July 31-Aug. 20; yield, per 18 feet,  $5\frac{1}{2}$  qts.

**HUMBOLDT:** Cane, reddish green, upright, tender, medium vigor; berry long, slender, small to medium; first and last picking, July 20-Aug. 5; yield, per 18 feet,  $4\frac{3}{4}$  quarts.

**KITTATINNY:** Fully described in report of 1904; first and last picking, Aug. 5-Aug. 25; yield per row, 5 quarts.

**SNYDER:** Also fully described in report in 1904; first and last picking, July 28-Aug. 18; yield per row, 7 quarts.

**STONE'S HARDY:** Cane, brownish red, strong upright grower, hardy and productive; berry oblong, oval, small to medium; first and last picking, Aug. 2-22; yield per row,  $4\frac{1}{2}$  quarts.

**TAYLOR:** Cane, greenish red, moderately vigorous, upright, spreading, hardy and productive; berry medium, oblong oval; first and last picking, Aug. 2-20; yield per row, 5 quarts.

**WESTERN TRIUMPH:** Cane, dull red, strong grower, upright and hardy, very productive; berry medium oblong, round; first and last picking, Aug. 2-20; yield per row, 7 quarts.

**NOTE.**—A row of bushes 18 feet in length is taken as the basis of yield in all of the above varieties.

Blackberries do not succeed up here; they either winter kill or suffer with the drouth in the summer. Two varieties are doing very well, Eldorado and Snyder.

**ELDORADO:** Plant, strong and vigorous, half hardy, fruit large, without a core, quality good to best; yield, 109 oz.; ripe Aug. 6th.

**SNYDER:** Plant, vigorous and hardy; fruit, small to medium, rather dry and hard; yield 166 oz.; ripe July 6th.

#### NOTES BY G. C. CASTON, (*Simcoe Fruit Station*).

All small fruits, with the exception of strawberries, were a failure this year. Blackberries did well here up to the cold winter of 1903-4, but have never done as well since. This year the absence of snow and the soft, unseasonable weather of January, followed closely by hard, cold weather, so injured the blackberries that they bore little or no fruit. This is a vexatious business, when one spends time and labor pruning and cultivating, and gets nothing for it. However, given our usual quantity of snow, and an average winter, I quite hope the blackberries will again do well. For the first few years of fruiting, I had some crops which could not be excelled for quantity and quality. I am only growing two varieties, Agawam and Eldorado, and I do not feel like discarding either of them yet. Agawam is the hardiest of the two.

NOTES BY CHAS. YOUNG, (*Algoma Station*).

Blackberries have never been satisfactory. I made a mistake in planting by setting a double row along a fence, where the snow covered them five feet deep in winter. I did this with the idea of protection from frost. That part was all right, but in spring, when the thaw came, the heavy weight broke the canes off by the ground, the few berries that did form usually dried up before they ripened. I have selected two varieties, which I consider the hardiest and most likely to succeed, Eldorado and Agawam. In 1905 I received Snyder, Kittatinny, Erie and Gainor, and planted them in what I consider a more favorable location, topped the canes and cut the laterals back in the fall. They have made excellent growth, and went into winter in fine shape. I hope to be more successful, but, in the meantime, I am satisfied that commercially they will not be a success here and I would not advise planting any of them. Even if successful there is no present demand for the fruit.

## CHERRIES.

NOTES BY LINUS WOOLVERTON, SECRETARY FOR ONTARIO FRUIT STATIONS.

The Cherry crop has been more satisfactory this season than for two seasons past. Two of the worst evils of the cherry orchard were almost lost to sight, viz., the aphid and the rot. In some orchards the aphid has been reported, but in our experimental plot not one is to be seen, a great contrast with some other years in which they were so numerous as to render the crop almost worthless.

The rot has not been so little troublesome for years; why, I cannot tell. Frequent rains are usually assigned as the cause, but these have been as frequent as ever and yet we have fairly good fruit. Even the Bigarreus, a class most of all subject to rot, have this season given us a large percentage of clean fruit.

Spraying with Bordeaux is yearly becoming more and more highly appreciated as a remedy for rot. This season is the first in which I have harvested really fine Windsors. It is the most subject to rot of all the Bigarreus, and I had been deeply disappointed over them, having planted an acre to this variety alone. This season's experience makes me think I can save them by faithful spraying. I only gave them one application, but that was a thorough one, just after the fall of the blossoms. On several unsprayed Windsor trees the fruit was entirely worthless from rot, and no attempt was made to gather the fruit, but a plot of 100 trees that had been thoroughly treated yielded a good crop of magnificent cherries.

This season I laid down a part of the cherry plot to grass, but I am not pleased with the result. Montmorencys in sod gave much second grade fruit, while those in well cultivated soil were fine. Such very vigorous growers as Schmitz, Yellow Spanish and Windsor may succeed in grass, on sandy loam, for they go very much to wood if highly cultivated, but for slower growers I would favor the best of cultivation.



The old notion of planting cherry trees in the fence corners only and leaving them to shift for themselves is exploded. Cherries are a profitable crop and it will pay to give them the best of treatment.

Scarcity of labor for harvesting our fruit in Ontario, makes it unwise to plant too freely of any one kind. The wisest plan is to plant so as to have a constant succession, and thus employ a certain number of hands with some degree of regularity the season through. In cooking cherries I would plant about equally of the following three kinds to cover the whole cherry season, viz.: DYEHOUSE, which is earlier than the Richmond, and ripens about the middle of June; the MONTMORENCY, the great main crop pie cherry, coming in about the first week in July, and the ENGLISH MORELLO, ripening about the middle of July. The later is not so much in favor as the other two; still it is an excellent cooking cherry, and prolongs the shipping season about a week. This will give a month of cherry picking, and will occupy a gang of pickers from the close of strawberry season until raspberries are well upon us.

The picking of the cherry crop is the great bugbear in the way of growing it on a large scale; and yet a full crop of cherries is as easily and as quickly gathered as the same number of quarts of strawberries, barring, of course, the climbing. The usual cost of picking cherries is 15 cents an eleven-quart basket, when the crop is an average one; if not, about 20 cents.

Of the English cherries, it is a perplexing task to make out a list of varieties that are permanently desirable. They behave so differently in different seasons that one's ideas concerning their merits this year may be wholly changed next year. During the past forty years I have been growing a large number of varieties for both domestic and market purposes, and yet I am ever learning new pointers about them, and find my list of favorites becoming frequently modified.

For profit my favorites just now, to cover the season, are: Wood, Knight, Tartarian, Napoleon, Spanish, Elkhorn, and Windsor, named in the order of ripening.

For domestic purposes I would add Elton, Reine Hortense, Late Duke, Choisy and Schmitz.

#### NOTES ON VARIETIES.

The following notes are taken from my pocket note-book, made during the season in the orchard:

ABESSE: Morello, imported from Russia, 1883, by Prof. Budd. Tree, slow in coming into bearing, and even then unproductive; fruit, dark purple; flesh dark with red juice; subject to curculio; ripe June 15th to 20th; of no commercial value.

BRUSELER BRAUNE: Morello; no crop; ripened about 20th July.

CHOISY: Duke; ripened June 20th; tree vigorous, unproductive; short lived; fruit medium large, red, very rich, sweet and delicious; valuable for the amateur.

CLEVELAND: Heart; ripened June 20th to 25th; tree vigorous, usually productive, but this year a very small crop; very similar to Wood.

COE: Heart; ripened end of June; tree vigorous and productive; fruit large, pale yellow with rich sweet delicate flavor, but too tender to be popular as a commercial sort.

CONNECTICUT BLACK HEART: No fruit.

**DOWNER:** Sweet cherry; ripened beginning of July; not productive enough; color, red; flesh rich, sweet, melting and tender.

**DYEHOUSE:** Kentish pie; harvested June 20th; tree very productive; trees bent down with weight of beautiful fruit; fruit perfect; no rot, no curculio; a trifle earlier than Richmond and likely to displace that variety.

**EAGLE:** Heart; harvested July 10th; trees very vigorous, not productive; yield 1906 better than usual; fruit nearly black; flavor rich and is excellent quality for dessert; not valuable commercially.

**EARLY PURPLE:** Heart; no crop; not profitable.

**ELTON:** Bigarreau; followed Wood about June 26th; tree vigorous and productive; fruit pale yellow with red cheek, with sweet, excellent flavor; inferior to Wood and more subject to rot; quickly softens on reaching maturity.

**EUGENIE:** Duke; season about third week in June; no crop; not very productive.

**HORTENSE:** Duke; ripened July 1st; a very small crop of magnificent samples; seems to be too irregular in bearing to be profitable in the commercial orchard; one of the very finest for the home garden.

**IDA:** Sweet cherry class; ripened end of June; tree medium productive; fruit not very large, much taken by birds; not profitable at this station so far.

**KNIGHT:** Heart; ripened June 25th to July 1st; tree very vigorous and very productive; long lived, one tree at this station nearly fifty years of age, gave crop of six bushels; fruit large, reddish purple, sweet and excellent; no rot, no curculio; not subject to attack by birds; one of the best of the black cherries.

**LATE DUKE:** Duke; ripened first week of July; tree vigorous, upright, not very productive, no crop 1906; one of the finest of the Dukes for the home garden; resembles Royal Duke in experimental plot.

**LUTOVKA:** No crop; seems not to be very productive.

**KOSLOV:** A Russian Morello, with fruit very similar to English Morello, but the tree is a dwarf.

**DIKEMAN:** Late black Bigarreau of medium size; a long keeper.

**MAGNIFIQUE:** Duke; ripened 18th July; gave a very small crop; seems to be only moderately productive; ripens unevenly.

**MAY DUKE:** No crop.

**MERCER:** Fruit resembled Governor Wood, perhaps another name for the latter.

**MEZEL:** No crop.

**MONTMORENCY:** Pie; ripened 10th July; the last picking about 15th July almost worthless on account of curculio and rot. This is unusual with this variety, for in previous years it has hung a week after maturity without waste. Trees sprayed were much less subject to rot and curculio than those not sprayed. The fruit commanded ready sale at \$1 a basket.

**MONTMORENCY ORDINAIRE:** Similar to Montmorency.

**MORELLO:** Ripened 18th to 20th July; sometimes miscalled the Wragg, which is the old English Morello under a new name; dark red with colored juice; yielded a fair crop; trees somewhat recovered from the blight of 1905; a good commercial variety because it comes into the market when all other varieties are over.

**NAPOLEON:** Bigarreau; ripened first week in July; a good crop and less subject to rot than usual. When it can be grown free from rot, it is the most productive of all cherries, and the largest in size, unless perhaps we except the Yellow Spanish.



OHIO: Ripened end of June; a failure.

OLIVET: Duke; ripened the end of June; a fine large cooking cherry, but the crop was very light; the trees have never yet borne more than a half crop, and they have been planted ten years.

OREL 23 (in our previous reports by error called Orel 28): ripened about end of June, about with Richmond; a fine yield of red, sour cherries, equal to Montmorency; tree very hardy. We judge it would be one of the best for profit in northern sections.

OSTHEIM: Scanty crop; did not pay for picking.

PURITY: Pie; ripened end of June; a magnificent crop of clean fruit with few or no blemishes; tree loaded with fruit was a most attractive sight; possibly Dyehouse, sold under another name.

RICHMOND: Pie; ripened about middle of June; wasted rapidly where not quickly gathered and marketed; very much grown for market, but too perishable to be planted for principal crop; widely distributed from Richmond, Va.; Hogg thinks it a synonym for the Early Kentish; tree very productive; but apparently not very long lived.

ROCKPORT: Bigarreau; ripened last of June; usually very subject to rot, but this season we harvested about two-thirds of a crop of No. 1 cherries; the flavor is subacid and not nearly equal to that of Wood; we do not recommend this variety.

ROYAL DUKE: Duke; ripened last of June and beginning of July; very few cherries on the tree; usually an abundant bearer, and I count it the best of the Dukes for all purposes.

SCHMIDT: Heart; ripened first week in July; a failure so far as quantity is concerned; my trees, ten years planted, have borne scanty crops every year, so that the variety cannot be profitable; judging, however, by the size or beauty of the fruit and its excellent quality and high flavor, it has no equal as a dessert cherry, and should find a place in every garden for family uses. The fruit is jet black, of the largest size and high quality. Tree very vigorous (10); productiveness poor (4).

SKLANKA: No crop.

SPANISH: Bigarreau; ripened first week in July; a great success this year; it is usually very subject to rot, but is comparatively free this year from rot or curculio. Many of my trees are now nearly fifty years of age, and have reached a very large size. They have yielded very little sound fruit, for two or three seasons past, but this year gave a fine crop of beautiful cherries of the very largest size. This fruit is far the finest of the white Bigarreaus. The color is light yellow, with a blush on the sunny side.

STRAUSS WEICHSEL: Duke; ripened end of June; not profitable in the southern parts of the Province; tree shows itself fairly vigorous but not very productive; fruit dark crimson in color; juice colored; quality good; useful at the north on account of its hardiness.

SCHATTEN AMARELLE: Synonym for Shadow Amarelle.

SHADOW AMARELLE: Morello; ripened 10th to 15th of July; tree vigorous; shy in bearing so far; may be valuable on account of its late season.

SUDA HARDY: Morello; ripened first week in July; fruit resembles English Morello; tree fairly productive; quality medium.

WINDSOR: Bigarreau; ripened 10th to 20th of July; trees are very vigorous and productive; on old trees not sprayed the fruit was a perfect failure from rot, but on young trees thoroughly sprayed with Bordeaux, the crop was very good; fruit large to very large, fine for eating fresh, but not a good cooking variety, because flesh remains tough and clings to the pit after cooking. Probably this variety has been too much boomed.

WOOD: Heart; ripened about 20th of June; trees in my old orchard now fifty years old, and beginning to die, yield about 40 quarts of good fruit per tree, with about as many more spoiling with constant wet weather, or stolen by the birds, which are yearly becoming more troublesome; very little rot on these trees, which were thoroughly sprayed; the finest early dessert cherry, and profitable for market; sold for 75 cents per eleven-quart basket.

WRAGG: Practically another name for English Morello.

NOTES BY A. E. SHERRINGTON (*Lake Huron Station*).

The fruit buds of the Duke and English varieties were all killed, hence no crop, but the Morello class yielded a good crop where the birds did not take them. The best varieties for the district are: Early Richmond, Montmorency, Ostheim, English Morello, ripening in order mentioned, but English Morello and Montmorency are the two most reliable varieties.

I cannot give any report as to yield, as so many were taken by the birds.

NOTES BY J. G. MITCHELL (*Georgian Bay Station*).

We had this season the finest crop of cherries in years, with such varieties as Windsor, Mary Duke, Ostheim, English Morello, Montmorency, Yellow Spanish, Early Richmond, Olivet, and the Common Red and Black.

These varieties are too well known to need description, and all of them are doing well, except Yellow Spanish, which is rather tender. Montmorency, Olivet and the Common Red and Black are the most profitable, and also the most reliable with us, in about the order named.

NOTES BY G. C. CASTON (*Simcoe Station*).

None of our cherries fruited this year. Some of them have not recovered from the effects of the winter of 1903-4, but no doubt the principal cause was the peculiar weather of last winter. For the first time in many years we had no snow, and the lack of this is a serious thing for the fruit here. The latter part of January the weather was unseasonably mild and open, so much so as to start the sap in most of the trees. Following close on this came the coldest week of the winter. Twice within a week the mercury went 24 degrees below zero. The result was injury to cherries and plums, both in roots and fruit buds; in fact, the fruit buds were so destroyed so that both cherries and plums were a failure this year. I would not advise planting the cherry for commercial purposes here at all. It would be a very uncertain business, and not at all likely to prove profitable. A few trees of the Morello class for home use is all I would recommend.

NOTES BY HAROLD JONES (*St. Lawrence Station*).

My report on cherries must be very brief, owing to the crop being a complete failure. There were a few blossoms on Orel, Ostheim, and Montmorency, but on examining them they were found to be all destroyed in the pistil.

Such varieties as Orel, Ostheim, Vladimir, Montmorency, Early Richmond, and E. Morello, are quite hardy here in wood, but the fruit bud suffers to such an extent that it is a very doubtful crop.



NOTES BY CHAS. YOUNG (*Algoma Fruit Station*).

With this fruit I can congratulate myself on being somewhat successful, the more so in that, when I first began with them, I had little hope of success. I do not mean to say that every year there is a full crop, but every year there is a fair crop of sour cherries. I had the impression, when I first planted, that the most suitable soil was that inclining to sand; I have since found this to be a mistake and have them growing on from light sandy loam, resting on a sand bottom, to stiff red clay, and, while avoiding either extremes, I have had decidedly the best success on rather stiff clay, having plenty of fall to carry the water off. My best trees, carrying the heaviest and surest crops, are on this soil, with a full northern exposure, and I may say having a full sweep of wind, clear across Lake Superior.

The varieties I would recommend are Early Richmond, Orel, Montmorency and English Morello. I can see no difference as regards hardiness. Ostheim has never produced a sufficiently full crop; it is a fair cherry to eat out of hand when fully ripe, but is no hardier than any of the others. At a distance of several miles from any large body of water, I find this fruit is not to be depended on. Whether it is absence of moisture or the effects of spring frost on the buds I am not prepared to say; perhaps both combined.

All the sweet cherries, without any exception, that I have tried, are not sufficiently hardy. The tree may live for several years, but I have had no fruit to speak of. I am now trying a few, headed so low that the snow will cover them over in winter. Late Duke and Elkhorn are, so far, sufficiently hardy.

## CURRANTS.

NOTES BY A. W. PEART (*Burlington Station*).

COMMERCIAL LIST. *Red.* Cherry, North Star, Prince Albert, Victoria, Wilder. *Black:* Collin's Prolific, Naples, Saunders. *White:* Grape and Imperial.

UNDESIRABLE VARIETIES, not further described, but fully reported in 1904: Crandall, Belle de St. Giles, Brayly, Raby Castle, Red Dutch.

Following are descriptions and notes of varieties revised to date:—

BALDWIN: Planted, 1903; fair grower; fruit, medium size; sub-acid, black; first and last ripe currants, July 20, Aug. 10; yield, one quart per bush (average of six).

BLACK VICTORIA: Planted, 1903; strong grower; fruit, large to very large; sub-acid; first and last ripe July 15, Aug. 5; yield per bush, 1 1-2 quarts.

BOSKOP'S GIANT: Planted, 1903; strong grower; berry, black; large to very large; acid to sub-acid; first and last ripe July 10-30; yield, one quart per bush.

BEAUTY: Planted, 1903; very strong grower; berry, black; medium to large; sub-acid; first and last ripe July 20, Aug. 10; yield, one quart per bush.

CHAMPION: Planted, 1904; moderate grower; fruit, black; large to very large; sub-acid; first and last ripe July 25, Aug. 15; yield per bush, one quart.

**COMET:** Planted, 1903; moderate grower; fruit, red; acid; medium to large; first and last ripe, July 10-31; yield per bush, one quart.

**CHERRY:** An old standard variety that holds its own with newer varieties; fully described in report of 1905; yield this season per bush, three quarts; first and last ripe, July 5-31.

**COLLINS' PROLIFIC:** Planted, 1898; very strong grower; productive; berry, black; large to very large; sub-acid; first and last ripe, July 20, Aug. 10; yield per bush, three quarts.

**FAY:** Also an old standard variety, described in report, 1904; first and last ripe, July 10-30; yield per bush, two quarts.

**LEE:** Fully described in 1904; first and last ripe, July 20, Aug. 10; yield per bush, 1 1-2 quarts.

**NAPLES:** This old variety is scarcely superceded by the newer ones; average yield per bush, 3 1-3 quarts; first and last picking, July 20, Aug. 6.

**NORTH STAR:** Planted, 1896; strong grower; productive; fruit, medium to large; acid; first and last ripe, July 15, Aug. 5; yield per bush, average, two quarts.

**PERFECTION:** Planted, 1903; moderate grower; currant, medium to large; acid; red; first and last ripe, July 10-30; yield per bush, one quart.

**POMONA:** Planted, 1907; Moderate grower; fairly productive; red; medium to large; sub-acid to sweet; first and last ripe, July 10-30; yield per bush, three quarts.

**PRINCE ALBERT:** Planted, 1897; a strong and productive grower; very acid; first and last picking, July 15, Aug. 15; yield per bush, three quarts.

**RED CROSS:** Planted, 1896; strong grower; not very productive; fruit, red; medium to large; sub-acid; first and last ripe, July 10-30; yield, one quart per bush.

**RED VICTORIA:** Planted, 1896; bush very vigorous and productive; berry, medium; acid; first and last ripe, July 10-31; yield per bush, three quarts.

**SAUNDERS:** Planted, 1897; a strong productive grower; berry, black, large; sub-acid to sweet; first and last picking, July 20, Aug. 10; yield per bush, two quarts.

**STANDARD:** Planted, 1903; strong grower; fruit medium; black; sub-acid; first and last ripe, July 15, Aug. 5; yield, 1 1-2 quarts per bush.

**SUCCESS:** Planted, 1903; moderate grower; black; sub-acid; medium size; first and last ripe, July 12, Aug. 5; yield, one quart per bush.

**VERSAILLES:** Planted, 1896; moderate grower; not productive; berry, red, medium size, acid; first and last ripe, July 5-30; yield per bush, two quarts.

**WHITE GRAPE and WHITE IMPERIAL:** Fully described in previous reports; the former as the more productive, the latter of the finest quality.

**WILDER:** Planted, 1896; strong productive grower; currant, red, medium to large, sub-acid; first and last ripe, July 10, Aug. 5; average yield per bush, 2 1-2 quarts.

**NOTE.**—Currants generally were not so productive this year as the average.

Comparative yields of currants for years 1902-1906 inclusive, with average per bush per year:—



COMPARATIVE YIELDS of Currants for years 1902-1906 inclusive, with average per bush. per year.

	1902.	1903.	1904.	1905.	1906.	Five years.	Average per bush. per year.
	Quarts per bush.	Quarts per bush.	Quarts per bush.	Quarts per bush.	Quarts per bush.	Total.	
*Baldwin.....				$\frac{1}{4}$	1		
Belle d' St. Giles.....	$2\frac{1}{2}$	$1\frac{1}{2}$	1	1	2	8	$1\frac{3}{5}$
*Black Victoria.....				$\frac{1}{2}$	$1\frac{1}{2}$		
*Boskop's Giant.....				$\frac{1}{4}$	1		
†Brayley.....	3	4	$2\frac{1}{2}$	4	2	$15\frac{1}{2}$	$3\frac{1}{10}$
*Beauty.....				$\frac{1}{3}$	1		
Champion.....	3	4	2	3	2	14	$2\frac{4}{5}$
*Comet.....				$\frac{1}{2}$	1		
Cherry.....	$4\frac{1}{2}$	$5\frac{1}{2}$	4	5	3	22	$4\frac{2}{5}$
Collins.....	$2\frac{1}{2}$	$5\frac{1}{2}$	4	4	3	19	$3\frac{4}{5}$
Crandall.....	4	$4\frac{1}{2}$	$5\frac{1}{2}$	4	3	21	$4\frac{1}{5}$
Fay.....	$3\frac{1}{2}$	4	$2\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{1}{2}$	15	3
Lee.....	3	4	$2\frac{1}{2}$	3	$1\frac{1}{2}$	14	$2\frac{4}{5}$
Naples.....	3	$4\frac{1}{2}$	3	4	$3\frac{1}{2}$	18	$3\frac{3}{5}$
New Victoria.....	$4\frac{1}{2}$	5	5	5	3	$22\frac{1}{2}$	$4\frac{1}{2}$
North Star.....	$4\frac{1}{2}$	$5\frac{1}{2}$	$2\frac{1}{2}$	4	2	$18\frac{1}{2}$	$*3\frac{3}{5}$
*Perfection.....				$\frac{1}{2}$	1		
Pomona.....	$4\frac{1}{2}$	4	$3\frac{1}{4}$	4	3	$18\frac{3}{4}$	$*3\frac{3}{5}$
Prince Albert.....	4	$4\frac{1}{2}$	4	5	3	$20\frac{1}{2}$	*4
†Raby Castle.....	5	6	4	5	3	23	$4\frac{3}{5}$
Red Cross.....	4	$4\frac{1}{2}$	$3\frac{1}{4}$	2	1	$14\frac{3}{4}$	$*2\frac{4}{5}$
†Red Dutch.....	$6\frac{1}{2}$	$7\frac{1}{2}$	4	$3\frac{1}{2}$	2	$23\frac{1}{2}$	$*4\frac{3}{5}$
Red Victoria.....	6	7	5	5	3	26	$5\frac{1}{5}$
Saunders.....	3	5	4	4	2	18	$3\frac{3}{5}$
*Standard.....				$\frac{1}{2}$	$1\frac{1}{2}$		
*Success.....				$\frac{1}{4}$	1		
Versailles.....	3	4	3	$2\frac{1}{2}$	2	$14\frac{1}{2}$	$*2\frac{4}{5}$
White Grape.....	4	5	$2\frac{1}{2}$	3	2	$16\frac{1}{2}$	$*3\frac{3}{5}$
White Imperial.....	3	4	$1\frac{1}{2}$	$1\frac{1}{2}$	1	11	$2\frac{1}{5}$
Wilder.....	4	$5\frac{1}{2}$	4	5	$2\frac{1}{2}$	21	$4\frac{1}{5}$

\* Planted recently.

† Rather small, and therefore discarded, yet they give a heavy yield.

#### NOTES BY HAROLD JONES (*St. Lawrence Station*).

CHERRY, RABY CASTLE, and VICTORIA, in reds have given the best results.

FAYS is disappointing in both wood and bunch.

POMONA has not shown any special feature of merit, and is not holding its own with the three varieties mentioned above.

PRINCE ALBERT is a strong, vigorous bush, with an abundance of foliage, but the fruit is too late in ripening and is very acid.

WHITE GRAPE gives good results, and is a desirable and valuable currant.

VICTORIA (Black), is very large in fruit, but does not give as good crops as Lees Prolific.

#### NOTES BY CHAS. YOUNG (*Algoma Station*).

This is a fruit that never fails here. Our climate and soil seems perfectly adapted to it. An old experienced grower from the east, in looking

over the experimental plot this fall, made the observation that I had left more fruit on the bushes after picking than what they would consider a full crop. Be that as it may, it is a crop that never fails; plenty of stable manure, shallow cultivation, cutting out all wood over three years old, meets all the requirements. I have very little choice of varieties. In some, the individual berries are larger, but the gross yield is no better. Versailles red and Champion black are perhaps as good as any; White Grape is not saleable here. No disease or insect troubles them, but what can be easily controlled with Paris green or hellebore. After strawberries this is the best paying crop I can grow, and the supply is not nearly equal to the demand. Taking into consideration the small amount of labor required and the certainty of a crop, currants have always been satisfactory.

NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

Currants were a fair crop, about equal with last year, in fact, to the box. In reds, the favorites are Red Cross, Fays, Prince Albert and Cherry; in blacks, Champion and Naples; in whites, White Grape, Wilder, and other varieties which have not fruited sufficiently yet for me to say much about them. A few new varieties, such as Perfection, were planted last spring; in all, I have about eighteen varieties.

CHERRY: Bush of spreading habit, not as strong as Fays or Red Cross; fruit, large; color, red; quality, good; yield per bush., 83 oz.; ripe July 18th.

CHAMPION: Bush strong, vigorous and hardy; fruit, large; color, black; quality, best; yield, 63 oz. per bush; ripe, July 18th; one of the best.

CHAMPION: Bush, strong, vigorous and hardy; fruit, very large; color, red; quality, good; yield, 97 oz. per bush; ripe, July 18th.

NORTH STAR: Bush, rather small canes and weak, hardy; fruit, small; color, red; quality, poor; yield, 68 oz.; ripe, July 30th.

NAPLES: Bush, strong and vigorous, hardy and healthy; fruit, large, black; quality, good, yield, 66 oz.; ripe, July 18th.

POMONA: Bush, a rather poor grower, not as vigorous as it might be; fruit, medium to large; color, red; quality, best; yield, 83 oz.; ripe, July 10th.

PRINCE ALBERT: Bush, strong and vigorous, with handsome foliage, healthy and hardy; fruit large, red; quality, good; yield, 112 oz.; ripe, July 30th.

RED CROSS: Bush, a strong, vigorous grower and hardy; fruit, large; color, red; quality, best; yield, 63 oz.; ripe, July 20th.

RABY CASTLE: An old variety, but good in its place; a heavy cropper; bush, strong and vigorous, very hardy; fruit, small; color, red; quality, rather acid; a late variety; hangs on the bush well; yield, 78 oz.; ripe, July 30th.

WHITE GRAPE: Bush, strong, upright grower; fruit, medium to large; color, white; quality, good; yield, 50 oz.; ripe, July 15th; the best white Currant.

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## GOOSEBERRIES.

NOTES BY HAROLD JONES, (*St. Lawrence Station*).

DOWNING maintains its character for prolific bearing and perfect freedom from disease, but the fruit is rather small for ready sale.



GOLDEN PROLIFIC, planted 1905, gave a scattered crop of large, handsome berries, and as the bush seems free from disease it gives promise of being of value.

CHAMPION, planted 1905, gave a good crop of fruit, but the size was no better than Downing, with more small berries. However, the fruit hung in clusters in a way that made harvesting very easy and rapid, and it may prove of value on further trial.

#### NOTES BY CHAS. YOUNG, (*Algoma Station*).

These have always been satisfactory, and, although not as sure a crop as currants, in no year have they failed to make a satisfactory return for the attention they received. I have fourteen varieties under test. Our old berry, the Houghton, bears heavily, but is too small. Downing is better in regard to size, but no better in quality. Pearl has fewer small berries than the former, and looks on that account better in the basket, but smaller in regard to yield. The English berries, although larger, with me are not so profitable, nor do I consider the quality as a rule as good; they are mostly thick and tough in the skin, and do not make as fine a quality of preserves as the Downing or Pearl. Sometimes an individual bush will give an extraordinary crop, but they cannot be depended upon like the American varieties. The best may be Industry. Red Jacket produces well, but the bushes are small yet. I have not seen a mildewed berry for years, and I take no special precaution to prevent it. The local price keeps always the same, 10c. a box. The same cultivation as for currants is all they require. I would hesitate to put plow between the rows, or use any tool that would go deeper than a horse cultivator. I do not approve of the system of growing from a single stem; it has many disadvantages and nothing to recommend it, unless, perhaps, a little easier to get at the berries.

#### NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

The gooseberry crop was about one-third less than last year, but the quality was good. The demand for this fruit is steadily growing, prices for the last few years have been quite satisfactory; the chief varieties grown are Downing and Pearl; ten varieties are now under test; a number of the new have not fruited yet, except a very few berries not worth recording.

DOWNING: Bush, strong and vigorous, hardy; fruit, medium to large; color, green; quality, good; yield, three quarts per bush.

PEARL: Bush resembles Downing in every respect; fruit also, cannot see any difference; yield, three and two-third quarts.

CROWN BOB: WHITESMITH; yield a few berries, but of so small quantity that it was not worth noting.

RED JACKET: Bush, strong, vigorous, hardy, of spreading habit; fruit, large; color, red when ripe; quality, good; a profitable variety; yield, per bush., four quarts.

## GRAPES.

#### NOTES BY M. PETTIT, (*Wentworth Station*).

Another year's experience with the varieties of grapes grown at this station proves that the list for profit already given is still correct.

AGAWAM (Rog. No. 15) has been the most profitable this year. Closely following are Delaware, Catawba, and Niagara. The next for profit have been Campbell's Early, Champion, Concord, Lindley, and Worden; then Wilder, Moore's Early, and Moore's Diamond.

Wet weather, during the last of June and the first week in July, caused an unusual form of fungus; the grapes when quite small turned a pale color, dried up and dropped out, leaving the clusters thin and unshapely. Niagara and some of the Rogers suffered most. Later, the foliage, on unsprayed vines, became very weak, and a considerable quantity of it dropped off. Vineyards that were sprayed with the Bordeaux mixture before they bloomed were entirely free from this trouble; those sprayed every ten days after it appeared were in fair condition, but it was clearly shown that one spraying before blooming was of more value than three or four times after the fungus appeared. With a good port spraying outfit, one man, with one horse, will spray eight or ten acres a day, which will add in most seasons from 10 to 50 per cent. to the value of the crop.

All the varieties I have in cultivation have been fully described in previous reports, and their productiveness this year does not justify making any changes in those reports.

The first 100 baskets of Champion was gathered this year on Aug. 28th and sold at 30c. per basket.

Campbell's Early, on Sept. 3rd, sold at 35c. per basket.

Moore's Early, on Sept. 3rd, sold at 28c. per basket.

Red Rogers, on Sept. 6th, sold at 30c. per basket.

Niagara, on Sept. 11th, sold at 25c. per basket.

Worden, on Sept. 12th, sold at 20c. per basket.

Delaware, on Sept. 15th, sold at 30c. per basket.

Concord, on Sept. 19th, sold at 17c. per basket.

Agawam and Catawba were sold, on Oct. 20th, at 22c. per basket for car load.

By J. L. HILBORN, (*South-western Station*).

There are very few grapes grown here for market purposes, except on Pelee Island, and the acreage there is small since the winter of 1899 when many of the vineyards were frozen out.

Nearly all varieties of grapes do well here, and I am satisfied that grape growing, especially of the early varieties, and properly handled, would prove very remunerative.

Practically no pears, and not many apples, are grown for shipping purposes lately. Most of the apples are either canned or evaporated.

## PEACHES.

NOTES BY L. WOOLVERTON, GRIMSBY, ONT.

BEER'S SMOCK: This peach impressed me favorably as being larger and more attractive than Smock, though perhaps not quite so late in season. It ripened during the first week in October. The fruit is yellow, with red cheek; the flesh yellow, tender and juicy and of a good flavor.

CARLISLE: Quite a different peach from the one grown under that name about St. Catharines, which is a yellow flesh and ripe in September. This



is a large, white flesh peach, with greenish, white skin, not showy in appearance, but quite large in size, and hangs on the tree until the 20th of October, or even later.

**CHAMPION:** This was in season early in September, coming in with the last of the Yellow St. John. It was one of the most productive varieties in the orchard and has been ever since the trees came into bearing. The color is yellowish white, with red cheek, and the flesh whitish; the flavor is delicious. I would highly commend this peach for the home garden. I am not prepared to pass judgment upon it for market purposes, because it competes with the Yellow St. John.

**CROSBY:** Season, middle to last of September, after the Early Crawford is well out of the market. The fruit is medium in size, yellow fleshed, and firm enough to be a good shipper. The tree is vigorous and productive.

**EARLY CRAWFORD:** This old variety still holds the first place as the best all round peach grown in Ontario. The fruit buds do not seem to be quite as hardy as some other kinds, but in favorable localities the tree is quite productive. The fruit is magnificent, being very large, of beautiful golden color, with a rich crimson cheek. There are several other peaches competing with it, such as Garfield, Fitzgerald, Millionaire, New Prolific, Reeves, Wonderful, etc., but if Early Crawford were the novelty, we believe it would create a tremendous boom in the face of them all.

**ELBERTA:** This peach is coming to the front in Ontario as a leading commercial variety, and is being planted by the thousand: perhaps it is being over-planted, like many other favorites. During the past season Elberta excelled itself. The trees were vigorous and healthy, without a sign of curl leaf, to which many claimed they were subject, and they bore prodigious crops. The fruit was immense in size, notwithstanding the quantity; and there were no small ones to cull out. The shipping quality of this peach is one of its points of merit. We are hoping to be able to export it to Great Britain with success next season.

**FITZGERALD:** Of the Crawford type; excellent in quality; an excellent market peach; by some counted more profitable than Early Crawford.

**FOSTER:** Another of the Early Crawford type; of tender flesh; by some considered superior to the latter in quality, and consequently especially desirable for home uses.

**GREENSBORO:** Of about the same season as Alexander, but larger and rather more desirable for home uses. 1st picking, August 6th; fruit was rather acid, but good cut up with cream; not very attractive; too tender for distant shipments.

**HYNES:** The very nicest little peach for dessert, beautiful in color and delicious in flavor, flesh tender and juicy, semi-free; should never be omitted from the home garden, and shows up beautifully in the shipping basket.

**JACQUES RARERIPE:** A fine peach of the Early Crawford type, and nearly the same in season.

**LATE CRAWFORD:** Inferior to Early Crawford; tree not very productive; drops fruit early.

**LEWIS:** A beautiful, large, round, white fleshed peach with rich crimson well covering the skin; of the best quality for eating; tree very productive; season, about middle of August; a valuable market variety.

**LONGHURST:** A magnificent canning peach; small and unprofitable where not thinned or uncultivated; but where well grown, large and fine, and very profitable; fruit buds more hardy than some other kinds; season, last of September.

**MOUNTAIN ROSE:** A delicious dessert peach which should be in every garden; creamy white in color, tinged with red; flesh white, juicy, free.

**NEW PROLIFIC:** Of the Early Crawford type, but on my grounds rather more productive; season, early September; I believe it well worthy of a large place in the commercial orchard.

**OLD MIXON:** This old and excellent white-fleshed variety is superseded for market purposes by the numerous excellent yellow flesh varieties of the same season. It closely follows the Early Crawford in season.

**REEVES:** Of Early Crawford type, ripening middle of September; the tree is very vigorous, but lacks in productiveness.

**RIVERS:** An early variety, which was at first liberally planted in our commercial orchards, but now discarded because of its tender flesh which shows the slightest bruise. The color of skin or flesh is creamy white.

**SAINT JOHN:** A very popular market peach, closely resembling Early Crawford, but ripening a week earlier; about the earliest really valuable peach for the commercial orchard.

**SMOCK:** A splendid late market peach when the season is favorable for its ripening and coloring. This year, in many orchards, it was lacking in color; season, first week in October.

**SNEED:** This variety was very satisfactory with me this season, ripening the 22nd of June, and yielding wonderfully well; it was a poor shipper, but it had no Canadian-grown competitor. I picked the last about August 1st; the fruit is white fleshed, and very tender.

**TRIUMPH:** Where well thinned, large, fine and highly colored, with deep red and yellow ground; a good shipper; a semi-cling, and very variable; the tree is subject to twig blight, and should not be planted too freely.

**WONDERFUL:** Of Early Crawford type, but later in season; fruit large, golden yellow and very beautiful, but the tree is lacking in productiveness.

**NEW SEEDLINGS** are constantly showing up. Mr. A. Rutherford, of Grimsby, had in his orchard four trees of a remarkably large and fine yellow fleshed peach, later than Elberta; and Mr. Beverly Book has been showing another, still larger, a free stone, of excellent quality, ripening just in advance of the Smock.

The **SMITHSON**, a fine peach of the Early Crawford type, originating near Grimsby, has been planted to a considerable extent about Grimsby.

The **WELLINGTON**, a new yellow flesh peach, also late in maturity, is being offered for sale in the Niagara district. The fruit was very favorably noted by our Fruit Committee some years ago, and if the tree is productive the variety is valuable.

These varieties should be propagated and tested for us at our new Fruit Station near Jordan, as quickly as possible.

BY J. L. HILBORN (*South-western Station*).

The very serious loss of peach trees by the February freeze in 1899, and again in February, 1904, almost totally destroyed the peach orchards in this district, and since the latter date the plantings of this fruit have been much lighter than for a few years previously.

Many growers were more or less discouraged with peach growing, and turned their attention to other crops. This is the chief cause of such an increased quantity of tobacco being grown here the last few years, one hundred and fifty cars being shipped from Leamington the past season.

The growing of early tomatoes and other vegetables has also increased to a great extent, largely due to the loss of the peach orchards.



However, quite a number began planting at once, and have continued planting each season. A noticeable increase in the yearly planting is very evident, and, as the trees grow very rapidly here, Essex County will soon be sending a lot of peaches to market unless a calamity occurs again.

What is called the peach land here is of a peculiar nature, and appears to contain a large amount of mineral deposit which has the effect of causing it to warm up to a high temperature with the summer sun, and, if properly handled, we can get excellent early crops of vegetables, etc., and a great tree growth.

This same peculiarity causes it to freeze very readily and very hard, and as it is a very dry soil and we get very little snow as a rule, the frost penetrates deeply when we get a severe winter and destroys the roots of the trees. Judging from past experience, one is compelled to consider peach growing is somewhat of a lottery unless some means can be devised to prevent the roots of the trees from being destroyed when we get a severe winter.

As previously stated, there are not many peach trees in bearing here yet. However, we had a few old trees and some young ones that were bearing the past summer, and found the different varieties to behave much the same as in our former orchards. Following are dates of ripening of the few varieties that fruited this season; I expect to have more varieties in bearing hereafter.

TRIUMPH was gathered from August 8th to August 14th. This variety does very well on young trees, but runs small and rots badly as the tree becomes older; it is therefore disappointing.

ADMIRAL DEWEY is about the same season, is somewhat larger, a better color, does not cling much to the pit; and is much more satisfactory, but it also rots quite badly in older trees.

BARNARD ripened from Sept. 1st to 7th, is excellent quality, but too small to take well in the market.

BRIGDEN ripened Sept. 6th to 13th; an excellent variety.

ENGOL MAMMOTH follows this variety very closely, and while it is not so large or showy, it is of good size and quality, and an excellent bearer, and I know of no better variety to grow.

NEW PROLIFIC was harvested Sept. 12th to 18th; also an excellent variety.

ELBERTA was gathered Sept. 14th to 20th, did not do so well this season with me as it does sometimes; I think this variety is being overplanted.

KALAMAZOO, Sept. 20th to 25th.

BANNER, Sept. 24th to Oct. 4th, another excellent variety, but is sometimes small on young trees.

GOLDEN DROP, Sept. 29th to Oct. 8th; a profitable variety if properly pruned and thinned, otherwise too small.

LEMON FREE, Oct. 2nd to 9th.

I have fruited many other varieties in former years, and consider the following among the best varieties for this section of those I have tested: Brigden, Engol Mammoth, New Prolific, Elberta, Kalamazoo, Banner, Golden Drop.

Our soil is too light for the Crawfords to do well, therefore they have been but little planted of late.

#### WINTER PROTECTION OF THE PEACH TREE.

In this immediate vicinity peach growing is attracting much more attention than all other fruits, and if some means can be devised to prevent

the roots of the trees from freezing so severely during severe winters I think peaches could be produced here as good and at as great a profit as in any locality with which I am acquainted.

COVER CROPS are an excellent help in any orchard, and I have always sown all peach orchards with something calculated for cover crop ever since I have been trying to grow peaches.

I have tried everything recommended for this purpose, but the last few years have now settled on what I now consider is best suited for my purpose.

For young orchards, until they come into bearing, I sow Yellow Aberdeen turnips broadcast and harrow in. I like to have the orchard thoroughly cultivated up to the time of sowing, 12th to 20th of July.

In a bearing orchard, I like to cultivate to about Sept. 1st, then sow to oats rather thickly.

While cover crops are all right in an orchard, no cover crop that can be grown here will save the trees through such winters as those of 1899 and 1904, for the simple reason that directly around and under the trees is where we are most in need of protection, and it is impossible to get a growth of anything under a bearing peach tree at this season in this dry soil.

After losing two as fine peach orchards as I ever saw, I resolved not to give up in despair like many others, which may prove to be the best way, but to endeavor to learn by what means I could save my trees in future should we again be visited by such conditions as we have experienced.

When pulling out my 5,000 dead trees after my first loss, and again five years later when pulling out about 3,500, I examined a large number of trees and found that many of them appeared to have the greater portion of their roots still alive but the bark at the base of the tree trunk was completely killed just above the roots and this convinced me that the sand freezing so hard as it evidently did against this rather soft bark was responsible for much of the damage, and that this point must also be protected; therefore the next fall and every fall since we have protected every peach tree on our farm.

We first remove the soil at the base of each tree, and, if any Borers are present, dig them out. Then each tree is wrapped with building paper or veneer. The last two seasons I have used veneer for nearly all. Each tree is then mulched with litter of some sort, mostly old straw, procured wherever we can get the remnant of an old strawstack. Tomato vines and clover chaff have also been used to some extent. This is left under the trees, and the next season more is added if necessary. While this would appear to be a great deal of labor, and to take a lot of material, we do not find it very expensive, or to take nearly as much material as I at first imagined it would require.

The fact of this space beneath the tree being covered with this mulch is, I think, good for the tree, and saves considerable in the cultivation of the orchard.

We are still experimenting with different methods and material for this protection, but as we have not had a severe freeze since we have been giving protection, all trees have wintered well whether protected or not.

I am not anxious for another such winter as those that destroyed our other orchards to test the value of these different methods of protection, but if such should come, I think this may save our trees. However, I intend to continue to practice this system every season until something happens to convince me otherwise. There is still room for much experimental work along this line.



As previously stated, peach growing appears to be the all interesting fruit subject at present, and it would appear to me that the most important point of all is to discover some method if possible to grow orchards that would survive our precarious winters.

As the question of varieties is a very important one, and so many new varieties are being yearly introduced, if those that are likely to prove valuable could be tested, no doubt much valuable information could be gained, and much money saved the average grower who now has to do his own testing or plant the old varieties that have been tested. I have been planting several varieties not much grown in Canada that are likely to prove valuable, and am well aware that many new varieties now being offered are likely to prove valuable, especially if some of them prove to be capable of withstanding long shipments better than some of the older and otherwise good varieties.

NOTES BY W. W. HILBORN (*South-western Station.*)

The experimental plot of peach trees planted in the spring of 1904 has made a good growth this season. The trees came through the past winter in perfect condition. The ground among them had been sown to rye the previous autumn, which made a good covering during winter, and when plowed under in the spring adds humus to the soil. In the autumn every tree was banked up with a mound of soil twelve to fifteen inches high; this was removed in early spring. Early tomatoes were planted this season among the trees. When the crop was gathered the plants were pulled up and placed around the trees, and enough coarse manure added to make a good mulch for root protection during the winter, and the ground again sown to rye.

PEACH CULTURE. The cultivation of the peach in this locality had reached large proportions previous to the freeze-out during the winter of 1899. One thousand acres devoted to this fruit could be seen from our farm. Ninety per cent. of the trees were killed by root-freezing at the above date. Considerable replanting was done, and four years later another freeze-out occurred equally as severe as the first. Since that time there have not been many large orchards planted on account of the danger from root-freezing. Those that have been planted are doing well, and quite a number of growers are resorting to some method of root protection. The only danger from root-freezing is when we have a long period of continued freezing without snow or other covering on the ground. Frost sometimes penetrates four or five feet deep in our sandy soil, or below the roots of the trees, and when this occurs it is death to them. It is hoped that winter-killing may be prevented by the above method of mulching.

In planting an orchard, I prefer No. 1 one year old trees, and planted in spring just when growth begins. Head back to 2 or 2½ feet high; subsequent pruning should be done every spring after hard freezing weather is past. Cut back the past season's growth one-quarter to one-half, and thin out the head of the tree to give sufficient circulation of air and admit plenty of sunlight. During the first two seasons some early hoed crop may be grown among the trees. In August, or as soon as the crop is harvested, sow to some cover crop such as rye, crimson clover, turnips or rape.

VARIETIES. It is of the greatest importance to make a proper selection of varieties for a commercial orchard. Our customers want peaches regularly during the whole season, and one sort lasts but a few days, hence the necessity of selecting those kinds that will not only give a succession, but will produce fruit of the best quality. Everybody wants Crawford peaches, therefore we should select as far as possible of that type. The following varieties have proved very satisfactory with me, and are named in their order

of ripening; they cover the whole season: Alexander, Greensboro (white flesh), St. John, Garfield, Early Crawford, Fitzgerald, Prolific, Engol Mammoth, Elberta, Golden Drop, Bronson, Kalamazoo, Smock, and Banner (yellow flesh).

NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

All the peach trees planted before the hard winters of two years ago were killed out; the young trees planted since are doing well, but have not fruited yet. It is doubtful if ever we will have a peach that will be hardy enough to be successful here; it is no trouble to grow the trees, but the buds winter kill.

## PEARS.

NOTES BY M. PETTIT (*Wentworth Station*).

GIFFARD was one of the most profitable this season; the crop was heavy, free from scab and sold at good prices.

BARTLETTS were a very fine sample and in good demand.

FLEMISH BEAUTY, medium sample with considerable fungus.

ANJOU, a heavy crop and fine sample.

DUCHESS, a heavy crop; not so large as usual; they were shipped to Cape Town, South Africa, at a good price.

KIEFER, a full crop; not as large as usual; in good demand for canning at 1½c. per lb.

PEAR BLIGHT has been very destructive at this station and throughout this district during the summers of 1904, 1905 and 1906; the two first summers all blighted branches were cut out below any appearance of blight and taken out of the orchard. Even with this precaution, 25 Clapp's Favorite, planted 16 years, are entirely destroyed; of 100 Flemish Beauty planted over 20 years 48 were entirely destroyed, and all of the rest partially gone. Bartlett, of 170 planted about 20 years, 68 are entirely destroyed, 55 partly gone and not one left entirely free from blight. Piffard, of 520 from 12 to 20 years planted, 27 are entirely gone, about 50 slightly damaged, balance healthy. Kieffer, of 1,500 planted 13 years, 22 are entirely destroyed, about 50 slightly damaged, balance healthy. Duchess Dwarf, of 300 planted over 20 years, some were slightly damaged during the past summer.

All of the varieties mentioned have had continued cultivation.

SAN JOSE SCALE was found by the Inspector on two trees in the experimental orchard; one of them was cut down and burned, the other thoroughly sprayed with the lime and sulphur mixture, also all other trees in that orchard. A careful inspection was made by the Inspector during the summer and no scale was found.

CODLING MOTH has been much more destructive than in previous years, both in apples and pears. Swift's arsenite of lead and white arsenic were both used with Bordeaux, and showed a little in favor of the arsenite of lead.

NOTES BY HAROLD JONES (*St. Lawrence Station*).

Of the forty varieties of pears planted in 1896-97-98, only five have lived through the severe winters of 1903 and 1904. The injury was not due to root-killing, but they died down to the root. Those alive are:

BESSEMIANKA: Planted 1896; a vigorous, close, round head; hardy; fruits nearly every year, but fruit of no value, rotting at the core before maturity.



CLAPP'S FAVORITE: Planted 1896; an upright, vigorous tree; shows some injury from frost; fruit buds tender, only bearing in favorable seasons.

FLEMISH BEAUTY: Planted 1896; an upright, compact tree, hardy; bears fruit nearly every year; the most desirable to plant of all varieties yet tested.

RITSON: Planted 1896; fairly hardy, but shows injury in severe years; fruit bud tender; only a scattered crop in favorable years.

VICTORIA: A hardy iron-clad of Russian origin, but fruit of no value.

NOTES BY J. G. MITCHELL, (*Georgian Bay Station*).

We again have had a fine crop of pears. Such varieties as Anjou, Bartlett, Seckel, Duchess, Howell, Clapp's Favorite, Beurre Clairgeau Bartlett, Seckel, and Flemish Beauty, carried fine crops, all that could be desired. These are the well tried varieties, and succeed as well as apples.

We have quite a large number of varieties which have not fruited yet. Among these there is an importation direct from France. Some of them are very promising, while others are doing rather poorly. However, enough has been done along this line to show that pears of the best quality and also of the best varieties are grown quite as successfully in this district as any other fruit.

NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

The young pear trees are doing very well now, but quite a number were lost by the frost two years ago, and had to be replaced or grafted over; a few trees were lost this season by the blight; very few have fruited as yet, none worth reporting on; quite a number of Kieffer trees has been planted for top grafting. Those that have been grafted are making a vigorous growth, and I believe will make satisfactory orchard trees.

NOTES BY G. C. CASTON (*Simcoe Station*).

I have been top working a number of pears on Flemish Beauty and Russian stock, with a fair measure of success. Although the winter of 1903-4 was very hard on them, Bartlett has done the best so far, top worked on hardy stock. But I have in the orchard a block of trees of Clapp's Favorite, that are quite healthy and thrifty, and are just beginning to bear.

FLEMISH BEAUTY is quite hardy here, and is a long lived tree; but most years it is entirely worthless for fungus scab, as few people take the trouble to spray sufficiently to keep the fruit clean.

NOTES BY CHAS. YOUNG, (*Algoma Station*).

Up until the winter of 1903-4 this fruit did fairly well, that is, one might grow a few for home use; but for commercial purposes they have been, and I am satisfied will be, a failure unless we can get something different from what we have. As it is, there have been no pears here this year except some Russians, which we would be better without. With the exception of Kieffer, none were entirely killed in the spring of 1904; the roots and part of the trunk were alive and sent out strong, sappy shoots which in most cases were again frozen the following winter. Anjou is not considered very hardy, but it has stood the winter better than most of the others; Idaho perhaps next, followed by Flemish Beauty and Goodale. Out of twenty planted in 1900, only five remain with the original top, and they are not promising.

## PLUMS.

NOTES BY W. T. MACOUN, OTTAWA, ON HARDY PLUMS.

Each year's experience strengthens our conviction that for Eastern Ontario and for all Ontario north of latitude 45°, and in some places south of that, the main dependence for the present must be on the Americana and Nigra plums. As seedlings of the Domestica or European plums, are raised and fruited at their northern limit, there will, we feel sure, eventually be produced varieties of this class of plum which will extend its culture northward, but at present we have no plums of this class that can be grown in the northern parts of Ontario that will prove profitable if grown commercially. The seedling European plums originated on the Island of Montreal appear decidedly hardier than most of the named sorts. As these have not been described, as far as we know, in the reports of the Ontario Fruit Experiment Stations, the following descriptions are given of the four most promising varieties, namely, the Mount Royal, Raynes, Lunn, and Mountain:

**MOUNT ROYAL (Dunlop 54):** Fruit received from W. W. Dunlop, Outremont, Que. Fruit roundish, flattened at stem end; size medium; cavity medium to open, medium depth, somewhat flaring; stem short to medium, moderately stout; suture distinct, very slightly depressed; apex rounded, slightly flattened; colour dark purple; dots numerous, irregular, distinct; bloom blue, moderate; skin moderately thick, moderately tender; flesh greenish yellow, juicy, firm; stone below medium, roundish cling; flavour sweet, moderately rich; quality good; season early to mid September. Should be a good shipping plum.

**RAYNES (Dunlop 53):** Fruit received from W. W. Dunlop, Outremont, Que. Form oval, long, flattened on side of suture; size above medium to large; cavity medium depth and width, abrupt; stem medium length, moderately stout; suture distinct, slightly depressed; apex rounded; colour dark reddish purple; dots small, numerous, indistinct; bloom moderate, blue; skin thin, tender; flesh, yellowish green, firm, fairly juicy; stone above medium to large, long, oval, free; moderately sweet; quality above medium; season early to middle of September. A prolific bearer and should be a good shipper. A prune plum.

**LUNN (Montreal, No 60):** Fruit received from W. W. Dunlop, Outremont, Que. Form oval, broad (round oval); size large; cavity shallow. medium width, slightly flaring; stem medium length,  $\frac{1}{2}$  inch stout; suture a distinct line, very little if any depression; apex rounded, very slightly flattened; colour dark purple; dots fairly numerous, irregular, indistinct, brownish; bloom moderate; blue; skin, moderately thick, tough; flesh yellowish green, very juicy, fairly firm; stone large, oval, cling; sweet, rich; quality very good. Season early to middle of September. A fine dessert plum.

**MOUNTAIN:** Fruit received from W. W. Dunlop, Outremont, Que. Form roundish, flattened slightly at ends; size medium to above; cavity medium depth and width, slightly flaring; stem medium to long, moderately stout, suture distinct, usually slightly depressed; apex slightly flattened, colour, greenish yellow, more or less overspread with dull coppery red; dots numerous, yellow, distinct; bloom thin, bluish; skin moderately thick, tough; flesh yellowish green; stone above medium, broad, roundish, cling; sweet,



rich; quality very good; season early to middle September. An excellent dessert plum. Well worth propagation.

The variety known as Lachine is also a profitable kind to grow. It resembles the Yellow Egg somewhat. These varieties are not yet offered for sale by nurserymen, but they should be propagated as soon as possible, as they are valuable.

In addition to these Montreal seedlings, the hardiest kinds at Ottawa have been the Richland, Early Red Russian and Ungarish, which kinds have at times produced good crops. The Glass seedling is as hardy and healthy a tree as any European plum that has been tested, if not more so, but it has proved tender in the fruit bud, more so than the Early Red, which is not as vigorous a tree. The Perdrigon is a red European plum, introduced from France by the Trappist Fathers at Oka, Que., which has proved hardier than most kinds there. This has not fruited yet at Ottawa, but we have tested the fruit and find it of very good quality. The following description was made of it:

**PERDRIGON:** Form oval, flattened on one side; size large; cavity narrow, medium depth, abrupt; stem short to medium, stout; suture a distinct line, no depression; apex rounded; colour deep yellow, more or less overspread with red; dots numerous, distinct; bloom, moderate, pinkish; skin moderately thick, moderately tender; flesh yellow, moderately firm, juicy; stone large, oval, rough, free; flavor sweet and rich. Quality very good. Season early to mid September. A handsome dessert plum.

The following descriptions are given of the Early Red, Richland, and Ungarish:

**EARLY RED:** Form oval; medium size; cavity narrow, shallow, abrupt; stem medium length, slender; suture an indistinct line, no depression; apex rounded; colour dull purplish red; dots moderately numerous, yellow, distinct; bloom thin, blue; skin fairly thick, moderately tender; flesh yellowish green, juicy; stone medium size, long, oval, cling; moderately sweet with an acid aftertaste; quality medium. Season, late September. Of the Lombard type. Imported from Russia by Prof. Budd from Dr. Regel, St. Petersburg, during the winter of 1881-2. Prof Budd writing in 1890 said of this plum, 'This was sent out quite extensively eight years ago marked 'mixed Arab.' The sorts mixed were Early Red, White Nicholas and Black Arab,' most of the trees proved to be Early Red Russian No. 3.

**RICHLAND:** Form oval; size medium to above; cavity narrow, medium depth, abrupt; stem medium length,  $\frac{3}{4}$ -inch, slender; suture a distinct line, no depression; apex rounded; colour deep purplish red; dots fairly numerous, yellow, indistinct; bloom moderate, blue; skin thick, fairly tender; flesh greenish yellow, juicy, moderately firm; stone medium size, oval, flat, cling; sweet but not rich; quality above medium. Season, middle of September. Hardier than most European sorts. Originated on the farm of Randall Elden, Richland, Pennsylvania.

**UNGARISH:** Form long, oval; size above medium to large; cavity narrow, shallow, abrupt; suture distinct, very slightly if at all depressed; apex round; colour dark purple; dots moderately numerous, indistinct, brown; bloom moderate, blue; skin fairly thick, tender; flesh greenish yellow, firm, fairly juicy; stone large, long, oval, free; moderately sweet; quality above medium; season, middle of September. Introduced by Prof. Budd from C. H. Wagner, Riga, Russia.

This plum is somewhat like the Raynes (Dunlops, 53). A prune plum, promising on account of hardness.

None of the Japanese plums have proved hardy at Ottawa, although there have been a few specimens of Red June. Seeds of these were sowed, and from these have been produced the Togo and Oyama, two seedlings which evidently have Americana blood, although they resemble the Japanese in most particulars. Both of these varieties are hardier in fruit bud than any of the Japanese yet tested and both of them are quite promising. Quite a number of hybrid varieties with Japanese and Americana blood procured from the United States are being tested, but none of these have fruited. Good crops of Americana and Nigra plums are obtained every year at Ottawa, and some of the best varieties are not to be despised. Canadian nurserymen seem slow to propagate the earlier varieties, those usually advertised being among the latest. A good selection to cover the season is Odegard, Aitkin, Bixby, Mankato, Cheney, Wolf, Hawkeye, Stoddard, Bouncer, Admiral Schley, and Aren, and two very good varieties of more recent introduction. Cottrell is one of the best for eating out of hand.

A number of seedlings originated at the Central Experimental Farm have been named as they are considered very promising. These are Bouncer, Don, Caro, Consul, Sunrise, Welcome, Kilmore, Swift, Gloria, Fitzroy. Seedlings of these are being grown, some of which should fruit next year. What is aimed at is to obtain a large plum, with a thick skin, without astringency and having a freestone. The flavor of many kinds is very good. Nearly all these points have been obtained among sound varieties, and what is desired is to unite them in one.

NOTES BY J. L. HILBORN, (*South-Western Station*).

Plums are but little grown here, and this season were almost an entire failure, except in our own orchard. We have about 200 trees of Burbank which produced a good crop of excellent quality which sold readily.

Two thorough sprayings were given with Bordeaux mixture, which we thought did much towards the success of this crop.

NOTES BY M. PETTIT, (*Wentworth Station*).

The plum crop at this station was an entire failure. The buds of the Japan varieties were destroyed by winter killing, having started during the warm weather in January. Other kinds were destroyed by spraying with soda Bordeaux; that is, sal soda in place of lime in Bordeaux mixture. This was used during the spring of 1905, and killed this season's fruit buds.

NOTES BY J. G. MITCHELL, (*Georgian Bay Station*).

I regret to say that there is nothing new to add to last report on plums. There were no plums on the Station grounds or in the district to amount to anything, and just why they failed it would be very hard to say.

There was a magnificent crop of cherries, and all bloom about the same time.

Peaches were also a failure, only a few stray fruits to be found.

NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

The crop, as stated in general notes, was a total failure, some trees being killed straight by having the buds frozen; others sent out but a very small crop of foliage. It is doubtful if some of them come through the



winter alive. The Japan varieties seem to suffer the most in having the buds frozen. This is owing, no doubt, to the habit of starting growth so early in the spring, but still, in my opinion, they have a place in the commercial orchard.

NOTES BY G. C. CASTON, (*Simcoe Station*).

The Japan plums are practically all gone, a few trees of Burbank, half dead, are all that are left.

Of about forty varieties of the European class tested only one, the STAUNTON, has proved hardy here. This plum is quite healthy yet and is getting to be quite a large tree. It is a large purple or bluish plum of good quality, not very prolific, and the season is very late. My opinion, based on several years' experience with a large number of varieties, is that cherries and plums cannot be grown profitably except near large bodies of water. In fact, not far outside of the peach belt. I have a few plums of the Americana class growing yet, but they are poor stuff.

NOTES BY HAROLD JONES, (*St. Lawrence Station*).

The only plum to fruit in this section this year was Hammer. Even the wild types in the fence corners failed completely.

Of the European varieties that remain healthy in wood are Geuii, Glass Seedling, Nos. 54 and 53 Dunlop's Seedlings.

In Japans, Maru and Ogon continue healthy in wood, but do not bear. Red June and Burbank are injured, but alive and bore a little fruit in 1905.

The plums of Americans planted here, such as Cheney, Wolf, and Wyant, are not true to name and are being discarded.

NOTES BY CHAS. YOUNG, (*Algoma Fruit Station*).

Four years ago if the question was asked, what are the best varieties of plums to plant in the north? I would, without hesitation, have answered: "Plant Japans"; and in making out a list I would have started out with Red June, Burbank, Abundance, etc. But if the same question were asked today, I would first consider the individual;—what are his facilities for growing them? Would he be likely to give them sufficient care, attend to the cultivation, and give them what little pruning they require, etc? Or would he be most likely to stick them in the ground and, without any further care, go back in two or three years looking for fruit? To the latter I would say, plant Americanas and make out a list to cover the season, the best of them are late in coming to maturity, say the beginning of October; and to the former, instead of replying, "Plant Japans," I would mix up the list something as follows: Red June, Burbank, Lombard, Glass Seedling, Arctic, Green Gage, etc., not omitting a few of the Americans to fill in a season like the present, when we have no other. I see by the reports that they are scarce all over the country; they are more than scarce here, for we have none at all. Of course, this is an exceptional year, but a good all round crop of the better varieties is not to be depended on any year, with the exception of Lombard in alternate years.

## RASPBERRIES.

NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

The raspberry crop was much less than last year—about one-third. This was largely owing to the mild weather in January, followed by the severe frost; the summer also being very dry, the crop was materially lessened. A number of varieties have died out or have been discarded as worthless. The only varieties worthy of cultivation among the reds, are Marlboro', Herbert, and Cuthbert, ripening in order as given, but Herbert is by far the best yielder. In blacks, Conrath and Hilborn are the two best varieties; the purple varieties are not wanted in the markets, or the white either.

**CUTHBERT:** Plant, strong and vigorous, fairly hardy; fruit large, color dark red, quality best; yield, 216 oz. per 20 feet of row; ripe, July 20th.

**HERBERT:** Plant, strong, vigorous and very hardy; fruit very large, larger than Cuthbert; yield, 592 oz.; ripe, July 13th; this variety is by far the heaviest cropper of all raspberries.

**MARLBORO':** Plant, dwarfish in growth, hardy and healthy; fruit large, color red, quality very good; a good shipper, but rather dry for table use; yield, 272 ozs.; ripe, July 11th.

**PHOENIX:** Plant fairly vigorous, hardy and healthy; fruit medium to large, color red, quality good; yield, 170 ozs.; ripe, July 16th; will have to be discarded.

**TURNER:** Plant hardy, but lacks vigor; fruit small, soft, color dark red, quality good; yield, 223 ozs.; ripe, July 11th; will have to be discarded.

The *three best varieties* for commercial purposes are given in order of ripening, Marlboro, Herbert, Cuthbert; and for yield, Herbert, Cuthbert, Marlboro; for quality, Cuthbert, Herbert Marlboro'.

NOTES BY CHAS. YOUNG, (*Algoma Station*).

I may dismiss the varieties known as Black Caps, or those which root from the tips, by saying that I have tried them and found them wanting. The objectionable features are, they are more tender than others as a rule; the weight of snow breaks them down; mice have a fondness for girdling the canes in winter; they do not sell well, and I have never raised a paying crop. I have still a few that I grow for comparison but do not advise any one to plant them here.

Of those propagated by suckers, I have only four varieties: **MARLBORO':** large and early, but not as profitable as the others. **CUTHBERT:** perhaps further south would be the most profitable, but here the tendency to keep growing into winter is against it, the tops are more or less injured every spring. This latter variety, unlike the former, makes too many suckers, which require cutting out several times during the summer. I have tried laying them down and covering with earth, but with no satisfactory results, and seldom get as good a crop as I do of the Louden, which is not as fine in quality, being somewhat crumbly. My very best raspberry for quality is **BRINKLE'S ORANGE**. I do not lay them down in winter; the tops of the canes will be frozen back a few inches, but this berry has a tendency to throw out strong side shoots in the spring and requires much more room and fewer plants in a hill than any of the others to give the best results. It is also more liable to disease than any of the others, but for one's own use I would strongly recommend this variety. **LOUDEN**, I would recommend for profit



alone. I think it is better not to pinch back the tops of the canes in summer, but let them grow until spring. It is profitable to grow them here even where there are plenty of wild ones going to waste. I did not get a full crop this year; dry weather set in just when they began to ripen, and materially reduced the yield.

NOTES BY G. C. CASTON, (*Simcoe Station*).

The raspberries suffered from the same causes as the blackberries, and bore no fruit this year. We need something more hardy than Cuthbert to insure a crop every year. Looking over the lists of varieties tested elsewhere, I think the Herbert would probably fill the bill. This variety should have been tested at all the stations. I have applied for it three years in succession, but never got it. However, I have ordered a supply of plants for the spring on my own account, and will be able in a year or two to know whether it will be a success here or not.

LOUDEN is a good berry, a little hardier than Cuthbert, but does not sucker freely and is slow to propagate. The same may be said of the Miller.

MARLBORO's only qualification with me is its earliness—fits in nicely between the strawberries and the Cuthbert and other varieties.

I received a new variety this year called the Eaton, some of the plants of which bore a few specimens of fruit, and the berry is certainly a fine one. It will take a year or two to test it as to hardiness, but if it proves sufficiently hardy, it will certainly be an acquisition to the list.

## STRAWBERRIES.

NOTES BY PROF. H. L. HUTT, O.A.C., GUELPH.

The Ontario Agricultural College furnishes the following descriptive notes on a few of the leading varieties which have been tested at Guelph in comparison with over 400 other new and old varieties:—

BUSTER (Imperfect): The plant is very vigorous, with very long leaf stalk and large dark foliage. It is almost free from rust and propagates very readily. The fruit ripens rather late, is very large, only medium firm, and a salmon pink color, the seeds are deeply pitted. The quality is only fair and in flavor is slightly acid. This may make a good local market berry but is rather too soft for shipment. Compared with Clyde it is quite as large, somewhat firmer and a little darker in color.

FOUNTAIN (Perfect): A vigorous vine with large dark foliage, forming plenty of runners with strong fruiting crowns. This fruit is large, slightly conical in shape, somewhat inclined to be rough, very firm and a beautiful crimson color, seeds bright yellow. The flavor is mild sub-acid and the quality good. As a commercial berry it should rank favorably with Williams or Ruby.

HERO (Perfect): A vigorous plant with large light green leaves, makes runners freely and forms strong fruiting crowns. It is quite productive, the fruit ripens about midsummer, is of medium size, somewhat oblate in shape, medium to firm and a light crimson color. The quality is good, and the flavor pleasant. In trial shipments to Winnipeg by express, Hero arrived in better condition than any other in the consignment. As a commercial berry it is worthy of trial.

**PARSON'S BEAUTY (Perfect):** One of the most vigorous plants in the plot; the leaf stalk is stout and of medium length with a broad, dark leaf. A free plant maker and the fruiting crowns are very strong. It is very productive, the fruit ripens from mid season to late, is about the shape of Williams but has none of the objectionable green tip. The flesh is firm and the color dark crimson, seed yellow and few except at the tip. The quality is good and the flavor a pleasant sub-acid. As a late home use and market berry, Parson's deserves a place in any collection.

**RUBY (Perfect):** A good plant maker, the vines being stout and dark, very similar to Parson's Beauty. It makes runners freely and occasionally needs thinning to prevent the plants from becoming too thick. The fruit is large, firm, regular in shape, somewhat resembling Williams, but dark in color, the quality is good, flavor mildly sub-acid. This variety has done exceptionally well at Guelph, and is favorably reported upon from other sections.

**SPLENDID (Perfect):** A moderately vigorous vine with light green foliage, somewhat darker than most early varieties. It is a good plant maker and the fruiting crowns are strong. The fruit ripens among the earliest, is of medium size, very firm and a dark crimson color. The quality is good to best, and the flavor mild sub-acid to sweet. As a home use, early berry, it is hard to beat, and it is rapidly gaining favor as an early market variety.

**SUCCESS (Perfect):** The vine is fairly vigorous, making sufficient plants for a full row, but without any danger of overcrowding. The fruit ripens about mid-season, is conical in shape, of medium size, quite firm and a deep crimson color. It has a good appearance in the box, and from its record here for three years seems worthy of a place among the promising new varieties.

**WARFIELD (Imperfect):** The greatest plant maker in the plot, the leaf stalks are long and slender, leaves only medium in size. The crowns are strong and produce good fruit clusters. The roots are rather small and on dry soils or in a dry season it sometimes suffers from drought. Under favorable conditions, it is one of the heaviest croppers we have. The fruit ripens from early to mid-season, is slightly conical, medium size, very firm, and beautifully dark crimson color, seeds few and yellow, quality best, flavor acid. Highly esteemed for canning purposes.

#### NOTES BY E. B. STEVENSON, (*Strawberry Station*).

The season of 1906 was an ideal one in most respects, at least during the fruiting time, although not perhaps so favorable earlier in the season; but, on the whole one of the most favorable we have had for many years. During April the frost was very slow in coming out of the ground; we had very hard frosts on the 21st, 22nd and 23rd; not much rain before May. May came in with cold nights and frost; but much rain the first week; cold rain on the 8th and 9th, with snow flurries and heavy frost on the 10th and 11th. It turned warm on the 13th, with a warm rain up to 16th, when it became very warm, making great growth; but we had frosts on the nights of 19th and 20th, hurting the early bloom, with thunder storms on the 24th and 26th. We had some more frost on 28th and 29th, when the strawberries were well out in bloom. Mrs. Fisher's first blossoms out; also Peerless, which is a very shy bloomer; North Shore is a late bloomer. THREE W's is very full of bloom; also Howard's 3, which resembles the old Wilson.



*June 8th:* First ripe of Haverland and Clyde growing on a southern slope; on lighter soil, on the 11th picked first Irene and Tennessee Prolific on same soil.

*June 13th:* Van Deman, 1st picking on heavier soil, also Michel, August Luther, Oom Paul, Ernie, and Lord Sheffield.

*June 14th:* Early Beauty ripening, also Wild Wonder and Splendid.

*June 15th:* Good picking of Early Beauty, Oom Paul, Michel, Van Deman, Heflin's Early, Ernie, and Howard's 2; and 1st picking of Beder Wood and Warfield, and on the south slope and lighter soil a grand picking of Tennessee Prolific, Splendid, Parson's Beauty, Sample, Clyde and Haverland, which sold at 15c. per box in Guelph.

*June 17th:* First picking of E. Hathaway, Greenville, Wilson, 20th Century, Alice Hathaway, Senator Dunlop, and Johnston's Early; also Excelsior.

*June 21st:* We have had a week of rain; fog, with great heat; rust has developed on some varieties, viz., Howard's No. 2, North Shore, President Roosevelt, Wild Wonder; some on Seaford and Williams; picked Catharine and Lyon for the first.

*June 22:* Continued rain; berries growing large and fine; sold all I had at 10c. by the crate.

*June 23:* Picking most of the varieties to-day, except Abingdon, Cardinal, Mrs. Fisher, Peerless, Howard's 7, New Home, Elma, and North Shore; North Shore rusting very badly.

*June 25th:* A grand picking to-day; best berries I ever saw; very choice; sold best for 13 cents per box; the rest for 12½ cents. Howard's No. 3 and Three W's are both very heavy bearers, also Bismarck, very productive. Of the Three W's, I picked three boxes without moving; an immense crop.

*June 27th:* Picked Abingdon, Cardinal, North Shore, Ben Davis, Wonder, Commonwealth, Uncle Sam, Boston Prize, Minuteman.

*June 29:* Good picking Uncle Sam, Minuteman, Nimrod, and Victor.

*July 2nd:* Michel and E. Hathaway, Early Beauty and Ernie; Heflin's E. about over. 1st picking of Elma to-day, and also latest. The best to-day were: Three W's. Howard's 103, Annie Hubach, Auto, Lyon, Mead, Kitty Rice, Nellie Hubach, Wonder. President was grand, Minuteman, Howard's No. 7, Seaford, Woolverton, Saunders, Challenge and Beaver; a good picking of Almo; a fine picking of Cardinal, strong fruit stem, holding the berries up, easy to pick. Best sold for 15c. per box; the bulk of the picking sold for 10c. per box.

Three W's yielded to-day a box for every 2 feet of row. The best of the berries went 27 berries to the box—three layers of nine to each layer; 3 rows of 3 in a row; New Home, late, resembles Gandy; good picking of Aroma.

*July 6th:* Picked Howard's 96 and Howard's No. 2.

*July 9th:* Had a fine picking to-day of the following: President, Senator Dunlop, Woolverton, Abingdon, Haverland, Cardinal, Irene, Lyon, Auto, Minuteman, Boston Prize (too soft), Mrs. Fisher, Prof. Fisher, Uncle Sam, Bismarck, Elma, Latest, Aroma, Brandywine, North Shore, New Home, Gandy, Gen. de Wet, Peerless, Glen Mary, Commonwealth.

*July 13th:* Picked Abingdon, Cardinal, Mead, Latest, Irene, Three W's, Woolverton, Aroma, Klondike, Mrs. Fisher, Elma, Prof. Fisher.

This has been a year of very large berries and good prices. The rains, and warm, sunny weather following was just what the strawberries required to bring them to perfection; showing how much water strawberries require to produce their best. This was a season when we might say we had irriga-

tion, for we had all the water we needed, and had it just when wanted; we can also say this was a season when the wide, matted row showed up well, from which we picked almost as fine berries as from the narrow row. The wide row, having all the water needed, produced a great crop. Some varieties are especially responsive to conditions, the Sample and Dunlop especially so. On narrow rows and on lighter soil they ripen almost as early as Success; while on heavier soil and in wide matted rows, their season is almost as late as Gandy. For a juicy berry for the market, Kitty Rice. Minuteman, or President seem to be about perfect, being good growers, good yielders, perfect in form, regular, good color with a shine to them, firm and fair quality; they also look fine when in the crate. Among the best late varieties I may mention the Commonwealth. It ripens about with Gandy, is as large and fine as any and is very firm. Cardinal was at its best and is without doubt one of the best late sorts. The plant is all that could be desired except its pistillate blossom; the fruit stalk is large and strong, holding fruit up well; berry, large, glossy, easy to pick.

It is a good plan to test new varieties in the different ways, viz., hill, narrow and matted row, to discover to which way they seem best adapted. A few plants could be thus treated in each style so that comparison could easily be made. Many growers who have never tried the hill or narrow row system would be amazed to see the capacity of a strong, vigorous plant, whose runners have all been kept off; the size of the plant would surprise them, and the masses of fruit the plant would surround itself with would be a perfect revelation in fruit raising. There are not many, but those that have tried are aware of the productiveness of the strawberry when conditions are perfect.

The grower, who loves this plant, will note with great interest the various characteristics of the new kinds as they come out. It is wonderful how much each variety shows of a distinct individuality. There is an almost endless diversity in color of leaf, size of plant, growth; in length and size of runners, and in vigor; in shape and size of leaves. There is the plant that is small and hugs the ground, and the big, strong, rank grower, 14 inches high. There is the round, compact plant with close, dense growth of leaves; there is the flat, spreading, straggling plant with few leaves. Here is a plant most prolific in runners, and another one with very few. Here is the plant with runners making a plant every 12 or 14 inches from the parent, and there a plant with runners making new plants every 3 or 4 inches. Here are plants with runners like thin, wiry cords, and there are others with runners thick and fat like a lead pencil; here is a plant with a long, narrow leaf, and another with round, blunt-shape. Here is one thin and delicate of texture, and there is another thick and leathery. Here is a variety with a very dark green color having almost a black tinge; there is the light green, and another almost yellow; and so on in almost endless variety. The grower who loves his work will note all these points of differences and so come to know them.

My plots were treated as follows: The land had, for two previous seasons, roots on it; a good coating of stable manure, well rotted, was given, and it was then well ploughed and worked. After this, and just before planting, a light sowing of bone meal was given; then the plants were put into the ground, and kept free from weeds by frequent cultivation. In fall, after growth had stopped, a coating of coarse manure was put on. This mulch in the spring was raked into the rows between the plants. I did not give any spring cultivation. My trial plots yielded at the rate of 8,125 boxes per acre. I sold them, the best for 15c., some for 12½c., the balance none for less than 10c.



The old standards held a good place this season, and any variety that did not do fairly well the past season should be discarded at once, as not worth growing for any purpose. Among the best of the old sorts I might mention Haverland, Splendid, Tennessee Prolific, Sample, Williams, Brandywine, Glen Mary, Senator Dunlop, Warfield, Ruby, and Parson's Beauty. Among the newer varieties that stood in the front row this year are: Abingdon, Annie Hubach, Auto, Ben Davis, Commonwealth, Cardinal, Early Hathaway, Early Beauty, Kitty Rice, Latest, Minuteman, Mrs. Fish, Ernie, Heflin's Early, President, "Three W's," Uncle Sam, Victor, Wonder, Howard's No. 3. I will now endeavor to give a description of the different varieties in my trial plots and their worth to the public, in alphabetical order:

**ANNIE HUBACH (Perfect):** Sent out from Arkansas by H. & H.; good plant, strong and healthy, light green color, good runner, quite productive; berry large, bright scarlet, yellow seeds, berry hollow, pink flesh, fair quality; medium early.

**ABINGDON (Perfect):** Sent me by L. Blanchard, Mass.; a choice seedling; plant large, strong, healthy, yellow green, quite productive; berry large, roundish conical, crimson with red seeds, some of the pistillate berries cockscomb; flesh whitish pink, good quality, late, worth a trial.

**ARKANSAS BLACK (Perfect):** I will discard this.

**ALICE HATHAWAY (Perfect):** From Arkansas; healthy plant, good runner, productive; berry medium to small, scarlet, good quality.

**ALMO (Imperfect):** Sent me by Slaymaker & Son, of Delaware; chance seedling, found by Jas. Bane, of Judsonia, Ark.; plant strong, healthy and good size; good runner, berry about size of old Wilson; it is a dark red in color; the plant is quite productive, well worth a trial.

**AUTO (Perfect):** Sent out from Maryland; fine strong plant, healthy, good grower, quite productive; berry very large, dark scarlet, yellow seeds, roundish; flesh red and white streaked, medium in firmness, good flavor and quality; a fine one; one of the best this year. ...

**AUGUST LUTHER (Perfect):** Is early; plant small, does well on some soils; berry medium in size.

**ARMSTRONG (Perfect):** This variety, some say, is the same as New York, Corsican, Maximus, and Uncle Jim. The plant is large, strong and healthy, a good grower; medium in productiveness; berry is large to very large and good flavor.

**AROMA (Perfect):** One of the best late kinds; plant strong and healthy; the berry is large, round and fine; ripens about with Gandy and later.

**BEN DAVIS (Perfect):** Plant strong, good grower and healthy, productive; berry large, roundish conical, blunt at end, scarlet with yellow seeds, solid; flesh firm, pink, good quality and fine flavor; a good one, nice to eat out of hand.

**BEAVER (Perfect):** Sent me by M. Crawford, of Ohio; did better this year than ever before; plant hugs the ground, good grower, medium in productiveness; berry roundish conical, bright crimson, red seeds, the berry shines as if varnished; flesh pink, hollow, good spicy flavor and fine quality; a good dessert berry.

**BOSTON PRIZE (Imperfect):** Sent from North Carolina; plant good grower, healthy and productive; berry large, conical, pale scarlet pink, yellow seeds and soft fair quality; not very desirable.

**BUSTER (Imperfect):** Sent me some years ago by C. C. Stone. The plant is strong, healthy, quite productive, good grower; foliage dark green color;

the berry is large, roundish, bright red, medium in firmness, acid; medium to late season.

**BISMARCK (Perfect):** One of the best.

**BRANDYWINE (Perfect):** One of the best.

**BUBACH (Imperfect):** One of the best old sorts.

**BEDER WOOD (Perfect):** One of the best.

The above varieties have been so often described, they are so well known, they need no further description than to say they did well the past season, especially Bismarck.

**CATHARINE (Imperfect):** Sent me from Delaware, originated by J. F. Cannon. The plant is large, with thick, broad foliage, quite productive, good runner, makes plants freely; berry is large, roundish conical; red to the centre, colors all over; only need in firmness; good for near market.

**COMMANDER (Perfect):** Plant large, strong and healthy; only a few plants left to fruit, white grub injured it; will give report after another year's growing.

**CLYDE (Perfect):** One of the best known; very productive; did well, but does not make plants as freely, nor is the foliage as abundant as formerly; berry large, scarlet, good quality.

**COMMONWEALTH (Perfect):** Sent me from Massachusetts; originated by W. H. Munroe. Plant large, strong and healthy, productive; berry conical, large, dark crimson, seeds red, flesh red all through, mild flavor, firm; a good late.

**CARDINAL (Imperfect):** Sent me by the originator, Mr. Streater, of Ohio. The plant is strong, large and healthy, not a trace of rust, quite productive; fruit stalks are strong and hold the fruit well up, making it easy to pick; the berry is medium to large, and good color, looks well, firm and good quality; a valuable addition to our list; well worth a trial by commercial growers.

**CORSICAN (Perfect):** See "Armstrong."

**CLIMAX (Perfect):** Seedling from Bubach, by Mr. Graham, of Maryland; plant healthy, quite productive; berry large, roundish, scarlet, early.

**CHALLENGE (Perfect):** This is the first year the Challenge has amounted to anything with me; it had some very fine berries on this year, of best quality; not profitable.

**DUNCAN (Perfect):** An utter failure with me. I did not get a single berry from this variety; it is reported as doing well in other places.

**EARLY HATHAWAY (Perfect):** Sent me from Missouri; the plant is healthy, good runner; berry is roundish conical, flesh red all through, acid, fair quality, medium to large; scarlet, with yellow seeds; a good medium early; worth a trial.

**ERNIE (Perfect):** Plant healthy, a good grower, quite productive; berry ripens early, red with yellow seeds, round, large; a good medium early, good quality; well worth a trial.

**EARLY MARKET (Perfect):** From Arkansas; plant good runner, healthy, medium productive; berry scarlet, round and medium in size.

**EARLY BEAUTY (Perfect):** A good plant maker; quite productive; a good early berry; roundish; red; flesh red, acid, but good quality; worth a trial; a good one.

**ELMA (Imperfect):** A seedling from crossing Nettie and Roblin, fertilized by Joe; sent me by Jos. H. Black, of New Jersey; plant strong and healthy, good grower, productive; berry large to very large, round in shape, bright red, medium in firmness; flesh pink, nice spicy flavor and good quality; very late; first picking July 1st, last picking July 15th.



**EMPEROR and EMPRESS (Perfect):** By the late J. Little; resemble each other very much; same origin; plant strong, healthy, good grower, medium in productiveness; berry large and good quality; resembles the old Jessie very much.

**FAIRFIELD (Perfect):** Good plant maker; berry large, red, firm, and fair quality; it is an early; worth a trial.

**FLORETTA (Perfect):** Seedling of Bubach by Dr. Brown; plant good grower and healthy, fairly productive; berry large, somewhat irregular, a good early.

**GEN. DE WET (Imperfect):** Seedling of Bubach and Parker Earle, from N. J.; plant strong, healthy, a good grower, medium in productiveness; berry large and fine, somewhat soft, good color.

**GREAT WASHINGTON (Perfect):** Plant good grower, some rust, free runner and productive; the berry is large, conical, scarlet, quite firm, good flavor.

**GANDY (Perfect):** One of the last if not best late; so well known needs no further description

**GLEN MARY (Perfect):** One of the standards; plant strong, large and healthy, well known, did very well this season, hard to beat.

**GRANVILLE (Perfect):** Plant large, strong and healthy, a good grower, supposed to be from Minner's Prolific; berry is large, oblong, dark shining red, wasted; flesh solid and white inside, fine flavor; season medium to late.

**GREENVILLE (Imperfect):** Plant good grower, dark green like Bubach, quite productive; berry large, good color, resembles the old Bubach; medium in firmness; a good one for a near market.

**HOWARD (Perfect):** By J. H. Black, of New Jersey, from seed of Burton's Eclipse, crossed with Gandy; the plant is strong, healthy, dark foliage; very large, dark red and firm, season late, a good one.

**HOWARD'S No. 2 (Imperfect):** Originated by the late G. W. Howard, of Michigan; plant healthy, good runner, small, with some rust, but quite productive; berry medium to large, roundish, solid; flesh pink and medium in firmness; good quality; did well and worth trying.

**HOWARD'S No. 3 (Perfect):** Originated by A. B. Howard, of Massachusetts; plant healthy, very productive, good grower, light foliage; berry medium to large, solid, conical, bright scarlet, yellow seeds, firm, good quality and good flavor; a good market sort; well worth a trial.

**HOWARD'S No. 7 (Imperfect):** By A. B. Howard, of Mass.; plant strong and a good grower, productive; berry conical, good quality; a good one; worth a trial.

**HOWARD'S No. 96 (Perfect):** By G. W. Howard, of Michigan; plant good grower, healthy, and quite productive; berry medium to large, roundish, dark scarlet, yellow seeds; flesh red all through, solid, firm and of good quality; well worth a trial.

**HOWARD'S 103 (Imperfect):** Originated by A. B. Howard, of Massachusetts; not yet offered to public, sent me for trial; the plant is healthy one, good grower and very productive; the berry is large, roundish, conical, dark scarlet, firm and good grower; the flesh is solid and white inside, seeds imbedded; a good early; will prove a good market sort.

**HAM (Perfect):** By J. H. Black, of New Jersey; a seedling of Mary and Parker Earle, a good grower, plant strong and very healthy, dark foliage; berry large, dark red, smooth and firm; flesh deep red, good quality; well worth trying.

**HEFLIN'S EARLY** (Imperfect): This did very well this year; was one of the best medium earlies; the plant is healthy, the berry a good size for an early; well worth a trial.

**HAYERLAND** (Imperfect): One of the oldest and yet one of the best, most productive and best market berries we have; did very well; so well known needs no description. It is still at the front.

**IRENE** (Imperfect): Did well; plant healthy, good grower, quite productive; berry good color and size, well known; a good one.

**JOE** (Perfect): Seedling sent me by J. H. Black, of New Jersey; the plant is a strong, vigorous grower, healthy and productive; the berry is large, bright scarlet, obtuse, conical, very uniform in size, quality is good, season medium to late; a good one, worth trying.

**KITTY RICE** (Imperfect): Plant a good grower, making plants freely, healthy and productive; berry large, roundish, good color with a gloss; for a fancy market; firm and fair quality; looks fine in the crate; well worth a trial.

**LYON** (Imperfect): Plant healthy and good grower, quite productive; berry dark glossy red, long pointed, red seeds, flesh also red, good size, resembles the old Longfield; mid season to late; berry is good quality, spicy; a good one.

**LATEST** (Imperfect): This came from Massachusetts, by S. H. Warren; the plant is healthy, strong, stools out, makes few runners, quite productive; the berry is large, conical, good crimson color, flesh red, good quality; one of the latest, a good one.

**LOUIS HUBACH** (Imperfect): A seedling sent from Arkansas by Hubach and H; plant healthy, good grower, productive; berry bright dark scarlet, yellow seeds, conical, flesh red all through, and solid, medium in firmness, fair quality.

**LUCCAS** (Perfect): Plant makes runners freely, healthy, productive; berry round, scarlet, medium in size, good quality; did well.

**LESTER LOVETT**: This is so like Gandy it is almost impossible to see any difference between them.

**MRS. FISHER** (Imperfect): Seedling of Hubach and Sharpless, sent me by J. H. Black, of New Jersey; plant strong, healthy, good grower, quite productive; berry large to very large, bright scarlet, medium firm, good quality, late, valuable for near market.

**MEAD** (Perfect): It is a fine grower; the plant is strong and healthy, not a trace of rust; the foliage is dark green; the plant is quite productive; berry is large, roundish, coloring evenly, firm and good quality; a fine one; well worth a trial by all growers.

**MARK HANNA** (Imperfect): A strong grower, healthy, productive, and produces very large berries; somewhat rough, but of good color and fair quality.

**MRS. MARK HANNA** (Perfect): Plant is strong, developed some rust; the berry is large, but not very desirable.

**MRS. MILLER** (Imperfect): Plant large and healthy, free of rust and productive; the berry is large, bright dark red, flesh red, oblong, somewhat flattened and good quality; season medium to late.

**MELLIE HUBACH** (Imperfect): Sent me by Hathaway and Hubach, of Arkansas; the plant is a good grower, healthy, makes runners freely, and very productive; the berry bright scarlet with yellow seeds, conical, blunt at end, slight neck, flesh pink and white in center, acid but good flavor; a good market berry.

**MORNING STAR** (Perfect): Not very desirable.



**MINUTE MAN** (Imperfect): Plant a good grower, strong and healthy and quite productive; berry large, roundish, conical, crimson with yellow seeds; flesh reddish pink all through, medium in firmness, good quality; a good one for market, even a fancy market.

**MARGARET** (Perfect): One of the fancy kinds grown for a fancy market; it is late; plant healthy; berry large and fine looking; a good one, one of the finest.

**MARIE** (Imperfect): Seedling of Crescent; the plant is strong and healthy and quite productive; did very well this year; the berry is roundish, large, somewhat irregular, solid; flesh pink, somewhat sour but spicy, medium firm; a good market berry.

**NEW YORK** (Perfect): Resembles Corsican and Uncle Jim; plant large, strong and vigorous, healthy, medium in productiveness; berry is large, somewhat rough, good flavor, a fancy berry; did well this season.

**NIMROD** (Perfect): Plant originated by J. F. Bever, of Dayton, Ohio; the plant is small, hugs the ground, lies very flat, but is healthy, medium in productiveness; the berry is medium in size, bright scarlet, roundish conical, resembling the old Jersey Queen, solid, flesh pink, very good quality; might do for a fancy berry for the amateur.

**NORTH SHORE** (Perfect): Originated by W. H. Munroe and introduced by Mr. Pratt of Massachusetts, the introducer of Sample and Commonwealth; the plant with me is a good grower but it rusted very much the past season; it had some fine berries on but no doubt the crop was diminished very much by the rust; the berry is large, with yellow seeds; it is quite late in season; will give it another trial.

**NEW HOME** (Perfect): Sent me by the introducer, W. F. Allen, of Maryland; the plant is strong and vigorous, a good grower, resembles the Gandy very much in plant as well as in the berry, same season; I should almost take it for Gandy; large, firm, good quality, but with me no more productive than the old Gandy.

**OOM PAUL** (Perfect): Sent me by Mr. Kevitt, of New Jersey; the plant is large and healthy, making plants freely, only medium in productiveness; the berry is large, rather long and somewhat irregular, dark red and fair quality; did only fairly well.

**OLIVE'S PRIDE** (Perfect): Sent me by Mr. J. W. Hall, of Maryland; the plant is a very vigorous grower, healthy and very productive; the berry is very much like the old Crescent in size and shape; a good market sort; did well the past season.

**OSCAR'S EARLY** (Perfect): I have dropped this variety as undesirable.

**OLYMPIA** (Perfect): I have dropped this as undesirable; it has some good qualities, but not enough to keep it on the list.

**PARSON'S BEAUTY** (Perfect): One of the best; plant is strong and healthy, dark green foliage, and very productive; the berry is large, conical, resembles the Williams in shape and color; yellow seeds, medium in firmness, sub-acid, pleasant taste; one of the best market sorts.

**REYNOLDS** (Perfect): Originated in Delaware and sent me by W. S. Todd, of Delaware; the plant is large, with thick, leathery, dark green foliage, free from rust, a good grower, making plants freely, and productive; the berry is large, dark scarlet, with yellow seeds, flesh red to center, fair quality.

**PRESIDENT** (Imperfect): Plant large, good grower, has some rust, fairly productive; the berry is large and fine looking; made a good showing; would sell well and bring a fancy price; it did very well with me this season; worth a trial.

**PRESIDENT ROOSEVELT (Imperfect):** Plant a good grower, productive, makes plants very freely, but develops rust; did so the past season; berry medium in size, roundish, dull red color with red seeds, solid pink and white in center; flavor is good; not very desirable.

**PEERLESS (Perfect):** Plant is large and strong, dark color and very healthy, a good runner, shy bearer; the berry is large, roundish like Bismarck in appearance, only darker in color, fine flavor and best quality, but does not bear enough; only for the amateur grower.

**PERFECTION (Perfect):** Plant healthy, a good grower, but has some rust; quite productive; berry medium in size, conical, dark scarlet, firm and of good quality; did well with me this season.

**PROF. FISHER (Perfect):** A seedling of Bubach and Sharpless, sent me by J. H. Black, of New Jersey; the plant is large, strong and healthy, good grower and productive, fair quality; resembles Mrs. Fisher; did well.

**RIDGEWAY (Perfect):** Plant is healthy, stools out somewhat, productive; the berry is medium to large, dark bright red golden seeds, roundish; flesh red, firm and very good quality; mid season; had some very beautiful berries; a good one.

**RYCKMAN (Perfect):** Plant large and healthy, good runner, medium in productiveness; the berry is large with a neck, roundish, conical, good quality; is not productive enough with me; could be grown for a fancy market for dessert.

**SEAFORD (Imperfect):** This old variety did very well this year; produced some of the most beautiful berries I had; the plant is subject to rust but is a good grower; makes plants freely, and productive; the berry is long, large, dark crimson, yellow seeds, glossy, of best quality; a very fine one.

**SAMPLE (Imperfect):** One of the best market sorts; does well everywhere; is well known now; it has always done well with me; plant is vigorous grower, healthy and very productive.

**SPLENDID (Perfect):** Another splendid sort well named; a good pollinizer; the plant is a great grower of healthy plants, and very productive; the berry is large round, a bright scarlet, good quality; sold the first picking of Splendid for 15c. per box; one of the best market varieties.

**SUCCESS (Perfect):** Plant is healthy, strong, good grower, productive and early in fruiting; the berry is medium to large, roundish, good scarlet, good flavor; not very firm; all right for home grower.

**SENATOR DUNLAP (Perfect):** This is another grand berry, amongst the best this season; a rampant grower, as vigorous as any we have ever had and very productive of very large, regular, conical berries of a good dark scarlet or crimson; firm, medium, early to late; one of the best market varieties; well worth a trial.

**SUTHERLAND (Imperfect):** Good grower, healthy; berries medium in size; did well.

**SUPERIOR (Perfect):** Made a good return; did very well.

**STEVENS' LATE CHAMPION (Perfect):** Plant is healthy, a fair grower; long runners, dark green foliage, productive; the berry is large, good color; worth a trial.

**TENNESSEE PROLIFIC (Perfect):** One of the best market varieties; plant is a vigorous, healthy grower, not a trace of rust, and very productive; the berry is large, bright scarlet, firm and good quality; has always yielded a bumper crop.

**"THREE W's" (Perfect):** This new one was one of the very best for market; at one of the pickings I picked three boxes without moving; at another later picking I picked a box for every two feet of the row; very



productive; the plant is large, healthy, a vigorous grower; the berry is large, conical, blunt at end, fine bright red scarlet, seeds yellow, fine mild flavor, medium firm flesh, pink to white; one of the best of all this year.

**TEXAS (Perfect):** Plant is healthy, good grower, large size; does not make runners very freely; medium in productiveness; berry is large, red, firm, good quality; a good early.

**UNCLE JIM (Perfect):** Like New York (See Armstrong); resembles Corsican; I had Uncle Jim, Corsican and New York growing side by side; I could see no difference between them either in plant or fruit or season.

**UNCLE SAM (Imperfect):** The plant is large, strong and healthy, a good runner and productive; berry large to very large; if not the largest; roundish, scarlet, red and yellow seeds, flesh pink, good quality and flavor, medium in firmness; a good one; worth a trial.

**VAN DEMAN (Perfect):** One of the earliest; has a long season; does very well in some places and not so well in others; has done well with me; I picked it with the earliest, and it was one of the last; firm and best quality; a beautiful looking berry; looks as if varnished; well known.

**VICTOR (Perfect):** A good new variety sent me by Mr. Crawford; plant is strong, healthy, a good grower, dark green foliage; quite productive of fine looking large berries, dark crimson, with yellow seeds, firm and good quality; will be a good canner; originated by D. J. Miller, of Ohio.

**WONDER, or SAMPSEL'S WONDER (Perfect):** The plant is a strong, healthy grower, and quite productive of large to very large dark bright red berries; good quality; it is medium to late; one of the best; has come to stay with the standards.

**WILSON (Perfect):** Did fairly well, but there are so many better now I only grow it for the sake of comparison with the newer varieties.

**WILD WONDER (Perfect):** Sent me by the originator, J. Shank, of Illinois; a rampant grower, plant small, and rusted very badly; berry small, soft, but good grower; not very desirable.

**WM. BELT (Perfect):** An old standard; made a good showing; kept its place in front; so well known, not necessary to describe it; plant good grower, rusts some; first berry sometimes irregular; the rest are very regular, of conical shape, large and firm and fine quality; a good one.

**WILLIAMS (Perfect):** So well known, no description; did well.

**WARFIELD (Imperfect):** Never did better; most productive of beautiful, dark crimson berries; wants lots of water to do its best.

**WOOLVERTON (Perfect):** Did well; produced some of the finest berries; a fancy variety for fancy market.

**YANT (Perfect):** Plant strong, healthy, light green foliage, good grower and productive; berry is large, regular, with neck conical; good color; mid season; did well.

#### NEW VARIETIES FOR TRIAL.

I have received several new varieties and planted them in a trial plot for next year's fruiting. Most of them have made a good growth, free from rust. They are as follows: Advance, Abundance, Arnouts, Chesapeake, Hummer, Hundred Dollar, Beidler, Jacoma, Beaners, E. H. Ekey, Pride of the Valley, Oak's Early, Somerset Maid, Virginia, May King, Thompson's No. 3, "No. 99," Great Ruby, Nehring's Gem, King Edward.

## LIST FOR GROWERS AND SEASON OF FRUITING.

*Extra Early and Early.*

Van Deman, Michel, Success, Howard's No. 3, Excelsior, Cameron, Howard's No. 103, Johnson's Early, Beder Wood, Lord Sheffield, Texas, Early Hathaway, Springdale B., Fairfield, Ham, Staples.

*Mid-season.*

Burbach, Haverland, Reynolds, Splendid, Bismarck, Sutherland, Marshall, Tennessee Prolific, Senator Dunlap, Parson's Beauty.

*Mid-season to Late.*

Three W's, Victor, Wonder, Glen Mary, Lyon, Marie Saunders, Williams, Wm. Belt, Brandywine, Emperor, Woolverton, President, Kitty Rice, Yant, Mrs. Fisher, Sample, Uncle Sam, Uncle Jim.

*Late to Extra Late.*

Joe, Aroma, Gandy, Abingdon, Cardinal, Stephen's Late Champion, Nettie, Greenville, Latest, Howard's 96, New Home, Elma, North Shore, Commonwealth.

NOTES BY A. E. SHERRINGTON, (*Lake Huron Station*).

The strawberry crop here was a very poor one the past season, owing chiefly to the very dry season; the plants simply died outright with the drouth; the yield was only about one half. The varieties grown at the station as a main crop are Brandywine and Saunders, with a few Michel for early berries. A number of new varieties were planted in the spring.

**BRANDYWINE:** Plant a strong, vigorous grower; fruit large to very large, color dark red, quality the very best; a first-class berry for canning purposes.

**SAUNDERS:** Plant not as vigorous as Brandywine, but makes a good row; fruit large, dark red and firm, also a good canning berry.

**MICHEL:** Plant a great plant maker, needs to be planted in the row 24 to 30 inches, and the rows 4 feet apart; fruit, medium sizes, soft, but a good table berry, but does not yield enough to make it a profitable berry.

NOTES BY CHAS. YOUNG, (*Algoma Station*).

This is without any exception the best money-making crop I can raise. I do not care to tell every enquirer how much an acre of strawberries, at 10c. a box, will total up to, for in many cases my assertion would be received with the customary grain of salt; but I am always willing to advise anyone within reach of a village to try a few hundred plants, and have given away many thousand plants, just to encourage the cultivation. I have grown a good many varieties since I first settled here, but am not yet prepared to say which is the best berry. Some I have discarded altogether; others did exceedingly well for some time. Clyde, for instance, is now useless with me. Others again, highly recommended in the east, are away down with me—Williams, for example—and Texas, highly recommended by some growers,



last season hardly produced one-fifth of a crop. I still keep a few plants set out, even of the kinds that have failed, just for an object lesson to enquirers. I have found that when an old variety begins to fail it keeps getting worse; never better.

There are here sixteen varieties grown for market, the best of which last year was the old Bubach, closely followed by Brandywine, Glen Mary and Tennessee Prolific about equal, making a third of the number. Of the others received for experiment, one dozen of each, some had evidently been too long out of the ground. Judging from the return made last season there is no improvement. I have set out plants of all that made any runners for further trial. I plant in the spring, as soon as the ground is in working order, on ground that had been heavily manured for a previous root crop, in rows four feet apart and two and a half feet between the plants. This may seem a waste of ground to most growers, but land in the north does not cost much per acre, although manual labor does, and by planting at this distance I can do the greater part of the work with the cultivator. I never cover in the fall as it is not needed here, and I only take off one crop. The extent to which I grow is only limited to my ability to obtain pickers. I have advised several to go into strawberries, but still the demand for nice clean, fresh berries far exceeds the supply. Our season is later than in the east and lasts about five weeks. I have some seedlings which so far promise well, obtained from a grower in the east, which may produce something to be reported on later.

#### NOTES BY G. C. CASTON, (*Simcoe Station*).

I am now growing Fairfield and Lester Lovett, and I want something better than either. I have tried upwards of a hundred varieties of strawberries, and the most profitable of the whole list was the old Wilson and Crescent. But they have had their day, and we have nothing that I know of in the whole list of new varieties to take their place. Many new varieties are very fine berries, but when you pick them three times they are practically done, while the old Crescent and Wilson you could pick for two weeks or more and still be getting good berries. We shall probably never get the ideal strawberry, but if we want a really profitable berry, it will need, in my opinion, to have some Wilson or Crescent blood in it. I have tried a number of seedlings of my own, but never got anything that was worth propagating, until now I have one which I believe is a cross between Crescent and Williams, which I have decided to propagate. But it will need several years of trial under varying conditions, before knowing whether to commend or discard it.

#### NOTES BY HAROLD JONES, (*St. Lawrence Station*).

Strawberries were badly injured during the past winter owing to no snow and deep freezing of the ground in March. The varieties that gave the best results are: Woolverton, Williams, and Saunders. William Belt did fairly well, but was injured very much. Brandywine does not bear profitably, and the berry is too seedy, but the plant came through the winter remarkably well.

Of the newer varieties planted they were in most cases destroyed, and I had no opportunity of comparing values.

## VEGETABLES.

NOTES BY PROF. H. L. HUTT, O.A.C., GUELPH.

The following is a list of the varieties of vegetables recommended for general growing as a result of the tests conducted in the Horticultural Department of the Ontario Agricultural College, Guelph:

ASPARAGUS. Conover's Colossal, Palmetto.

BEANS. *Early*: Keeney's Rushless Golden Wax, Wardwell's Kidney Wax; *Medium*: Davis' Wax, Stringless Green Pod, Valentine.

BEETS. Egyptian (for extra early and transplanting): Eclipse Model, Black Red Ball (the darkest of the turnip varieties).

BRUSSELS SPROUTS. Long Island Improved.

CARROTS. *Early*: Early Horn, Chantenay, Danvers, Rubicon (an improved Chantenay).

CABBAGE. *Early*: Early Jersey Wakefield; *Medium*: All Head, Early Summer; *Late*: Danish Round Head, Houser (a very late variety not subject to black rot); *Red*: Mammoth Red Rock.

CAULIFLOWER. Erfurt Extra Select.

CELERY. *Early*: White Plume; *Medium*: Paris Golden Yellow, Chicago Giant (an improved White Plume with extra heavy stalks); *Late*: Evans, Triumph.

CORN. *Early*: Cory, Golden Bantam; *Medium*: Crosby's, Kendall's Early Giant; *Late*: Stowell's Evergreen, Country Gentleman.

CITRON. Colorado Preserving.

CUCUMBER. White Spine, Westerfield Chicago Pickling.

EGG PLANT. Black Beauty.

KOHL RABI. Early White Vienna.

LETTUCE. *For Forcing*: Grand Rapids, Hot House; *For outdoor, loose head*: Black Seeded Simpson; *Heading*: Hanson, Denver Market, Deacon, Cqs Trianon.

LEEK. Messelburg.

MUSKMELON. Rockyford, Montreal Market, Hackensack.

ONIONS. *White*: Southport White Globe; *Yellow*: Yellow Globe Danvers, Golden Globe, Prizetaker; *Red*: Red Wethersfield, Red Globe.

PARSNIPS. Hollow Crown.

PEAS. *Early*: Steele-Briggs Extra Early, Nott's Excelsior; *Medium*: Gradus; *Late*: Improved Stratagem, Champion of England.

POTATOES. *Early*: Early Ohio; *Medium*: Burpee's Extra Early; *Late*: Empire State.

PUMPAIN. Sweet Sugar.

RADISH. *For Forcing*: Rosy Gem, Scarlet Globe, Scarlet Conical; *Early*: Scarlet Turnip White Tip, Olive Shape French Breakfast, Long Scarlet Short Top; *Summer*: Chartiers, White Delicious; *Winter*: China Rose, Black Spanish, Osake.

RHUBARB. Victoria.

SALSIFY. Sandwich Island.

SPINACH. Victoria.

SQUASH. *Summer*: Crookneck, Delicata; *Winter*: Hubbard, warted, Golden Hubbard, Marblehead.

TOMATOES. Earliana, Chalk's Jewel, Success, Matchless.

TURNIP. Extra Early Purple Top Milan, Golden Ball.

VEGETABLE MARROW. Long White Bush.



**WATERMELON.** Hungarian Honey, Cole's Early, Halbert Honey, Iceburg.

### BEETS.

Among the 52 varieties tested the following are a few of the promising newer kinds:

**BLACK RED BALL** (Burpee): Shape round, but inclined to get angular with age; tops medium in size; color very dark, flesh color very dark red, zoned with crimson; quality good; season medium.

**EARLY MODEL**: Shape deep globular; size medium; color dark; quality good; tops medium in size and upright; season medium. Well worthy of a trial.

**DARK OX-BLOOD** (Bolgano): Size large; turnip shaped, with large tap root; quality good; color dark; season medium.

**RUBY DULCET** (Johnson & Stokes): Shape nearly round; size medium; color of flesh deep red zoned with crimson and white; quality good; season second early.

**COLUMBIA**: Round, turnip shaped, large size; tops medium; flesh color dark; quality good; season medium.

**CRIMSON GLOBE**: Shape globular; tops medium and upright; flesh color crimson, lightly zoned with white; quality good; season second early.

### CARROTS.

Among the 26 varieties tested, the following are promising new kinds:

**RUBICON**: Originated on Long Island, is of much the same shape as Chantenay; tops small; color of flesh deep red; fine grained. Was one of the heaviest yielders in last year's test.

**SCARLET BEAUTY**: Tops medium in size; shape of root between half-long and long; color deep scarlet; quality good; season medium to late.

**PRIDE OF MARKET**: Half-long, medium size; dark color; quality good; season early.

### CABBAGE.

Among the 68 varieties tested, the following new varieties are worthy of note:—

**HOUSER**: Shape flattened globular; very late; hard header, good keeper; proved to very free from blight; foliage broad, dark green with brown tints.

**DIAMOND WINTER**: Large solid head of the Flat Dutch type; foliage light green; short stem; head broad, flat and well covered with leaves.

**EUREKA** and **ALPHA**: Are alike, maturing about the same time as Early Wakefield; heads flat, quite deep and solid.

**GLORY OF ENKHOUSEN**: A promising mid-season sort; head medium in size, very solid; shape flattened globular.

**DANISH ROUND HEAD**: This is an earlier, shorter stemmed type of the Danish Ball Head. Heads averaging larger in size than the Ball Head, extremely hard and solid.

### CELERY.

The following new varieties of celery are worthy of note:—

**SNOW WHITE**: This is a select strain of White Plume, and appears to be an improvement on that variety, being truer to type and a little taller.

**CHICAGO GIANT SELF BLANCHING** (Vaughan): To all appearances a cross between Giant Pascal and White Plume, with the thick solid stalk and excellent quality of the Pascal and self-blanching habit of the White Plume. Is well worthy of a trial.

**MAGNIFICENT** (Gregory): A new winter celery of a very strong growth; a good keeper, and will compare in flavor with Paris Golden.

#### LETTUCE.

Among the 72 varieties tested, the following are worthy of additional note:—

**MORSE**: Plant forms a large, well-formed cluster of leaves, and may be used early, very slow to go to seed; leaves large, broad, stiff and blistered, of light green color, crisp and tender, quality good.

**A. 1** (Sutton): A crisp variety with large, distinct head, very slow to go to seed; leaves large, broad, thick, blistered and crumpled, of dark green color; crisp and tender; sweet in flavor and of good quality.

**DEACON**: A heading variety, medium to large in size and slow to go to seed; leaves broad, smooth, thick and soft; light grayish green in color; quality good.

#### ONIONS.

The following are three of the promising new kinds among 55 varieties tested:—

**AILSA CRAIG** (Sutton): This onion proved to be the heaviest yielder in the lot. Shape, elongated globular; very light straw color; thick skin, white crisp flesh and mild flavor.

**GIBRALTAR**: Very similar to Prizetaker, but more globular and of lighter color; does not ripen quite so early; bulbs are very tender and tops are of a lighter shade of green than most onions.

**GOLDEN GLOBE**: Shape elongated globe; skin thin and of light golden yellow color; flesh white and mild; tops small. This variety is a desirable acquisition.

#### RADISH.

Among 68 varieties of radishes tested, the following are a few of the promising newer kinds:—

**ICICLE**: This is the finest and longest of the early white varieties; crisp and tender; well worthy of a trial.

**WHITE DELICIOUS**: Good size, crisp, mild, will stand in condition for some time. One of the best of the white summer radishes.

**SURPRISE**: Oval shaped, deep yellowish brown skin; flesh white and crisp.

#### TOMATOES.

Among the 73 varieties tested this year, the three varieties described below stand out as the most promising of the newer early kinds. The short seasons at Guelph make it impossible for us to mature full crops of the latter kinds.

**WEALTHY**: Plant fairly vigorous and very productive, proved to be the heaviest yielder in the lot, producing 19 pounds ripe fruit per plant. Fruit medium size, round, smooth, red, firm, and good quality; early.



I. X. L. (Bolganio): Plant fairly compact and productive; season early; fruit medium in size, round, smooth, red, and fairly firm. Ranked third in yield in last year's test.

LIVINGSTON'S GLOBE: Plant large and fairly productive; season medium to late; fruit large, round, smooth, crimson, fairly solid and attractive.

NOTES BY E. E. ADAMS, (*Essex Vegetable Station*).

The season has been a fairly good one, weather conditions being fair to good, although we had a severe drought here during August and a part of September, which prevented some vegetables from developing to their best. The work for this season was not so extensive as is desirable, from the fact that my appointment as experimenter was not made until somewhat late in the season, and after a large amount of our planting was completed.

TOMATOES: However, some work was done, and in tomatoes a good number of varieties was experimented with to show if any advantage can be had in forcing later varieties as to earliness. Some of the early varieties are not always satisfactory, and I wished to note from actual work with the later varieties, if it is possible to so handle them that they can be forced into early bearing, as well as to produce a good crop. Twenty-four varieties were planted, twelve plants of a kind, and all were given same treatment in the hot-house, viz.: Seed was sown about March 1st, transplanted three times, and set in the field about May 24th, some being set with fruit, others showing no fruit or blossoms, but all fine, large stocky plants. These were planted on ground which had been fertilized the previous spring with barn yard manure, and after planting, one ounce of nitrate of soda was applied around the plant and hoed in. The varieties used were Acme, Early Michigan, Stone, Burpee's Combination, Matchless, Chalk's Early Jewel, Royal Red, Buckeye State, First of All, Mayflower, Livingston's Beauty, Fordhook First, Earliana, Magnus, Atlantic Prize, Moore's King of the Earlies, Earlibell, Plentiful, Dwarf Champion and Quarter Century. The experiment showed that the later varieties will not produce early, that the crop is decidedly smaller, that the size of the fruit is much smaller than when grown as a later crop. Burpee's Earliest Pink was also tried, but I can see no advantage in growing it above the varieties in general use. It sets a lot of fruit, but the size does not hold up well into the season. The quality is very good however. The earliest varieties are Earliana, Earlibell, Earliest Pink, Atlantic Prize and First of All; second early, Magnus, Champion, or Century, Fordhook First, Beauty, Early Jewel; and the later varieties are, Matchless Stone, Royal Red, Plentiful and Buckeye State. Most all these do very well on our sandy soil, but Champion and Buckeye State should, I think, have a heavier soil to produce pepping crops.

FOR EARLY PEPPERS: I would recommend the Long Cardinal and Neapolitan, and for later the Chinese Giant, although there are several others that give good results, viz.: Sweet Mountain, Ruby Giant, Ohio Crimson, etc.

FOR EARLY CABBAGE: The Extra Early Jersey Wakefield appears to give the best results, although Johnson and Stoke's Extra Early is somewhat earlier, and some growers prefer it. It is a cabbage of fine quality, pointed head, very sweet, crisp and tender, and where the true seed can be procured it will turn off a very nice crop. I find true seed hard to get, and as such is the case, not a very large quantity of it is grown now. Henderson's Early Summer, Early Spring and All Head are also good early varieties, but for

an early crop of even size heads, I know of none better than the Early Jersey Wakefield for our soil.

**CUCUMBERS:** Several varieties of cucumbers have been tested, but I find the Extra Early White Spine and the Arlington White Spine are preferred here, although the Early Cyclone is a somewhat earlier variety, but not as desirable in shape, size or appearance as the Spine varieties. I have used Perfection Hot House, a selection of the Spine varieties, for hot-house work this season, and for color, productiveness and general good qualities, I much prefer it to any other variety so far used. The Extra Early White Spine did not show up so well this year as in 1905, but the Evergreen was, as usual, good. It is a satisfactory cucumber, both for inside and outside work.

**SQUASHES:** Green and Red Hubbard squashes are the best grown with us, while the Large Field is the larger. Other varieties will be tested next season.

**ONIONS:** The best varieties of onions appear to be Giant Rocca, Prize-taker, Danvers, Red Globe, Wethersfield, Mammoth Pompeii and Giant of Gibraltar. The Yellow Globe, Danvers, Red Globe and Red Wethersfield are the best keepers and shippers, the Danvers being the favorite perhaps more on account of its color than any preference in quality. Extra Early Red is grown for first crop. It is of fair size and ripens up early, and can be marketed in August generally.

**CARROTS:** Improved Short White appears to be the best White Carrot, while Chantenay and Danvers are the favorite red varieties.

**CELERY:** White Plume celery is the main early variety, and Winter Queen, Giant Pascal, Golden Self Blanching and Golden Heart are preferred here, although Perfection, Heartwell and Perle le Grande are excellent varieties. Some varieties do well on certain soils, and on other soils are a failure, so growers should test for themselves to see which variety will best suit their purpose.

**POTATOES:** There being so many good potatoes now on the market, it is a hard matter to just say positively which is the best, but for extra early, on good soil, the Early Ohio is the earliest and best cropper of good sized tubers. While in this district they are not largely grown, yet on good soil they do well. Burpee's Extra Early and Bovee are the favorites here, although Sensation is coming to the front, and Mills' Early First Market will likely make a place for itself, as it is a very fine early variety.

**CORN:** Mammoth White Cob Cory corn is the favorite early market corn here, but is not of the best quality for early, and Country Gentleman and Stowell's Evergreen for later.

**BEANS:** Wardwell's Kidney Wax Beans and Golden Wax are the best early yellow podded varieties, and Stringless Green Pod for green pods. The Green podded varieties do not sell well in market on account of poor color, but where known, they sell well, the quality being very desirable.

**MUSKMELONS:** The muskmelons or cantaloupes which do best here are Extra Early Hackensack, Long Island Beauty, Osage, Paul Rose, Emerald Gem, Rocky Ford, and Defender. The Hackensack and Beauty are not of the finest quality, but grow to good size, and are the general favorites in the markets. The other varieties named are much the best in quality, especially the Emerald Gems. Their flesh is salmon color, and when fully matured are of the highest quality.

**SWEET POTATOES:** Jersey Sweet and Yellow Nansemond Sweet potatoes are the varieties grown here, but the Jersey Sweets are much the better in quality, but not as heavy producers.



**WATERMELONS:** Halbert Honey watermelon is about the best for home use, while Kleckley Sweets are about equal to them. Peerless and Fordhook Early are also good early varieties, and do well here on sandy soil.

Next season I trust to be able to show progress on other lines which have not been taken up this year.

#### DESCRIPTIONS OF VARIETIES TESTED.

**PRIZETAKER ONION:** Very large, nearly globe shaped, with skin of red straw color, measuring from 12 to 18 inches in circumference; ripens up hard and fine, and presents the handsomest possible appearance, the flesh is pure white, fine grained, mild and delicate in flavor; excellent for fall and early winter.

**GIANT OF GIBRALTAR ONION:** Similar in every way to Prizetaker, but larger.

**MAMMOTH GREEN SQUASH:** Largest squash grown; has been grown to 400 pounds under special culture for exhibition purposes; skin dark green, flesh golden yellow; mostly fed to cattle; quality not good enough for table use.

**RED HUBBARD SQUASH:** Identical in form and quality with the well known Hubbard squash, except that the heavily warted skin is of a beautiful bright red color; flesh, deep golden yellow, fine grained; cooks dry, and is of the finest flavor.

**WHITE CUSHAW PUMPKIN:** Similar in appearance to the Japanese Pie pumpkin, with the exception that the skin is white; flesh of very fine quality.

**HALBERT HONEY WATERMELON:** The finest watermelon for the home garden and for nearby markets; size averages 18 to 20 inches long; skin dark glossy green; flesh, a beautiful crimson; very desirable.

**NEAPOLITAN PEPPER:** The earliest mild red pepper, and the most productive; fruit, measures 4 inches in length by  $4\frac{1}{2}$  inches in circumference. The skin and flesh are bright red; they are thick meated, sweet and very mild, and keep in good condition a long time.

**LONG CARDINAL PEPPER:** The earliest pickling pepper; about 6 to 7 inches long; very hot; a very heavy bearer.

**ROSE OF THE NORTH POTATO:** A very early, fine quality potato; a good keeper; cropper; rose color; fine shape.

**BURPEE'S EXTRA EARLY POTATO:** The finest in quality of all early potatoes, and the earliest variety of good size; oblong shape; very pale brownish skin; few eyes; very productive.

**VERMONT GOLD COIN POTATO:** Strong grower; luxuriant deep green foliage; tubers good size; set closely in hill; skin thin, smooth and glossy, of a light golden tint; flesh, fine grained, of a pure pearly whiteness. A fine potato for main crop.

**CARROT, CHATENAY (stump rooted):** Splendid shape; fine deep scarlet color; roots of the finest quality.

**CARROT, EARLY GEM (Oxheart or Geurande):** Much thicker than the Early Horn; quality excellent, and is almost coreless.

**CARROT, IMPROVED SHORT WHITE:** Roots extra large, half long, smooth, tapering to a point, measuring 12 to 18 inches in length, and from 16 to 20 inches around the top; flesh solid and crisp, rich pearl white color; a very heavy cropper and the easiest carrot to harvest.

**POP CORN, QUEEN'S GOLDEN:** Produces abundantly, pops perfectly white and is of very fine quality.

TOMATO, SPARKS' EARLIANA: The earliest red, smooth tomato, of good size; quite uniform in size, averaging three inches in diameter, and from two to two and a half inches deep; quality good.

TOMATO, JUNE PINK: Ripens just as early as Earliana, foliage quite similar; handsome deep pink in color; not as valuable as Earliana.

TOMATO, CHALK'S EARLY JEWEL: A mid season variety, perfectly smooth; color, bright scarlet, ripening right up to the stem, without cracks or green core; flesh very solid, meaty, very few seeds; skin thin, in fact too thin to make it a good shipper, still it is fine for nearby markets.

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THIRTY-SEVENTH ANNUAL REPORT

OF THE

ENTOMOLOGICAL SOCIETY  
OF ONTARIO

1906

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(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

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PRINTED BY ORDER OF  
THE LEGISLATIVE ASSEMBLY OF ONTARIO



TORONTO:  
Printed by L. K. CAMERON, Printer to the King's Most Excellent Majesty  
1907





*To the Honourable WILLIAM MORTIMER CLARK, K.C.,  
Lieutenant-Governor of the Province of Ontario.*

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for the consideration of your Honour the Report of the Entomological Society for 1906.

Respectfully submitted,

NELSON MONTEITH,

Minister of Agriculture.

Toronto 1907





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# LIST OF CANADIAN MEMBERS OF THE ENTOMOLOGICAL SOCIETY.

## PROVINCE OF ONTARIO.

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Hallam, R.	"
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Silcox, Sidney.	St. Thomas.
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Smith, A.	Renfrew.
Smith, Walter.	London.

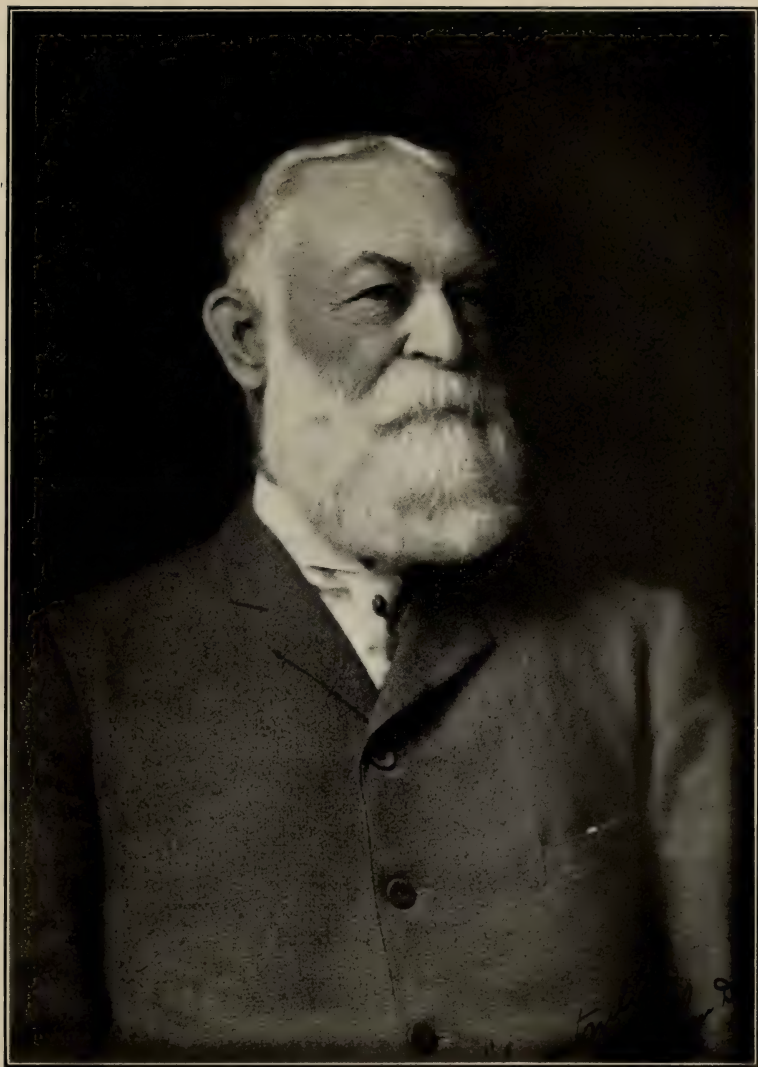
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Stewart, J.	London.
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Thompson, W. Robin, O.A.C.	Guelph.
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Wood, S. T.	Toronto.
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Bowen, Miss.	"
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Fyles, Miss W.	"
Fyles, Mrs.	"
Fyles, Rev. Dr. T. W.	"
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Hamel, Miss Julia.	Levis.
Hedge, Miss Lousia.	"
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Lindsay, Col. Crawford.	Quebec.
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Reford, L.	Montreal.
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Turner, Hon. Richard.	"
Turner, Mrs. R.	"
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Weir, Douglas.	Montreal.
Winfield, Mrs.	Quebec.
Winn, A. F.	Montreal.
Wood, Rev. Edmund.	"







JOHN D. EVANS, C.E.  
President of the Entomological Society of Ontario, 1904-1906.







PLATE A.

- |   |   |
|---|---|
| 1. Vein Gall of White Ash. <i>Eriophyes</i> sp.   | 4. Manitoba Maple Wart Gall. <i>Eriophyes</i> sp. |
| 2. Chokecherry Mite Gall. <i>Eriophyes</i> sp.    | 5. Poison Ivy Mite Gall. <i>Eriophyes</i> sp.     |
| 3. Hawthorn Serpentine Gall. <i>Eriophyes</i> sp. | 6. Birch Bud-Gall. <i>Eriophyes</i> sp.           |

(See page 56.)





PLATE B.

- |  |   |
|--|---|
| 1. Sugar Maple Pink frost-gall. <i>Eriophyes</i> sp. | 4. Beech frost-gall. <i>Eriophyes</i> sp.               |
| 2. Manitoba Maple frost-gall. <i>Eriophyes</i> sp.   | 5. Elm mite gall. <i>Eriophyes ulmi</i> .               |
| 3. Rock Elm frost-gall. <i>Eriophyes</i> sp.         | 6. Elm mite gall. Enlarged opening on<br>under surface. |



PLATE C.

1. Spiny Witch-Hazel Gall. (*Hormaphis spinosus*.)
2. Witch-Hazel Cone Gall. (*Hormaphis hamamelidis*.)
3. Cottonwood Petiole Gall. (*Pemphigus populicautis*.)
4. Hickory Cone Gall. (*Phylloxera caryae-fallax*.)
5. Cockscorn Gall on Elm. (*Colopha ulmicola*.)
6. Basswood Mite Gall. (*Eriophyes abnormis*.)

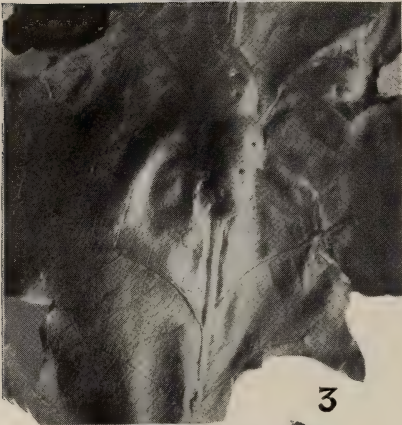




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PLATE D.

1. Furry Ball Gall on Oak. (*Andricus lana.*)
2. The Larger Oak-Apple. (*Amphibolips confluentis.*)
3. Oak Midrib Gall. (*Andricus piger.*)
4. Mossy Rose Gall. (*Rhodites rosae.*)
5. Vein Gall on Oak. (*Cecidomyia quercus-majalis.*)
6. Vein Gall on Blue Beech. (*Cecidomyia pudibunda.*)
7. Virginian Creeper Midrib Gall. (*Cecidomyia sp.*)



PLATE E.

- |   |  |
|---|--|
| 1. Ball Gall on Hickory. ( <i>Diplosis caryae</i> .)          | 4. Rose Stem Gall. ( <i>Rhodites globulus</i> .)           |
| 2. Spiny Ball Gall on Wild Rose. ( <i>Rhodites bicolor</i> .) | 5. Ash Gall. ( <i>Cecidomyia peller</i> .)                 |
| 3. Ball Gall on Wood Nettle. ( <i>Cecidomyia urticola</i> .)  | 6. Eye Spot Gall of Maple. ( <i>Cecidomyia ocellata</i> .) |





PLATE F.

1. Soft Maple Mite Gall. (*Eriophyes quadripes*).
2. Two specimens on left, Elliptical Goldenrod Gall. (*Gelechia gallaesolidaginis*.)
3. Two specimens on right. (*Trypeta solidaginis*.)

# Entomological Society of Ontario

1906.

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*To the Honourable Nelson Monteith, Minister of Agriculture:*

SIR,—I have the honour to present herewith the Thirty-seventh Annual Report of the Entomological Society of Ontario for the year 1906. It contains the proceedings of the Forty-third Annual Meeting of the Society, which was held at its new headquarters in the Ontario Agricultural College, Guelph, and also papers on practical and descriptive entomology which have been prepared for the information of farmers, fruitgrowers and gardeners as well as others who are interested in the work of noxious and beneficial insects.

*The Canadian Entomologist*, the monthly magazine published by the Society, has been regularly issued during the year, and has now completed its thirty-eighth annual volume. It continues to maintain its well-established reputation for scientific entomology.

I have the honour to be, Sir,

Your obedient servant,

CHARLES J. S. BETHUNE,

Ontario Agricultural College, Guelph.

Editor.



# Entomological Society of Ontario.

## OFFICERS FOR 1906-1907.

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# Entomological Society of Ontario.

## ANNUAL MEETING.

The forty-third annual meeting of the Entomological Society of Ontario was held in its new headquarters at the Ontario Agricultural College, Guelph, on Wednesday and Thursday, October 10th and 11th, 1906; the sessions were presided over by Vice-president Dr. James Fletcher, Dominion Entomologist and Botanist, Ottawa. Among the members present were Mr. John D. Evans, Trenton, the retiring President; Mr. Henry H. Lyman, Montreal; Mr. Arthur Gibson, Central Experimental Farm, Ottawa; Mr. C. H. Young, Hurdman's Bridge; Dr. Brodie and Messrs. C. W. Nash, J. B. Williams and Paul Hahn, Toronto; Mr. G. E. Fisher, Burlington; Mr. J. Fred Smith, San Jose Scale Inspector for Ontario; President Creelman, Professors Hutt, McCready and Bethune, Messrs. Jarvis, Zavitz, Eastham, Howitt, Barlow and Peart, of the Ontario Agricultural College and the Macdonald Institute. Letters expressing their regret at their inability to attend were received from the Rev. Dr. Fyles, Levis, P. Q.; Professor Lochhead, Macdonald College, Ste. Anne de Bellevue, P. Q.; Mr. A. McNeill, Chief of the Fruit Division, Department of Agriculture, Ottawa; Messrs. J. A. Balkwill, W. E. Saunders and John Law, London; Mr. W. D. Kearfott, Montclair, N. J.

Owing to the lateness of the train from the east, there was only time for a brief meeting of the Council on the morning of the 10th, at which some necessary business was transacted.

In the afternoon of Wednesday, October 10th, the Society met at 2.30 o'clock; owing to the large attendance, over a hundred being present, the meeting was held in the spacious Massey Hall. The proceedings began with a discussion on the Codling-worm.

## THE CODLING-WORM DISCUSSION.

DR. FLETCHER, the chairman, opened the debate by giving an outline of the life-history of the insect, the extent of its ravages and the ordinary methods of dealing with it. The following is a condensed summary of his remarks:

The Codling Moth is probably one of the most injurious insects that we have to deal with in Canada in fruit work. The remedies are all well-known, and are all sufficient, if a proper amount of care is taken by fruit growers. However, it is neglected by many, and I think the present state of the apple crop of this year is very largely due to fruit growers and farmers generally not having paid attention to the regular remedies which they ought to have made use of and not keeping their orchards clean and free from the codling moth as well as they might have done. A great deal of work and care are requisite, and as its habits vary somewhat in different parts of



Canada, it is necessary to know its life history. In my own observations I have found that east of Toronto, or about Toronto, there is practically only one brood in the year, while west of Toronto there are two. This means that in Western Ontario the fruit grower has a different and harder task before him. In Eastern Ontario, having only one brood to deal with, it can be practically controlled by the spring spraying, which everybody seems to have energy enough to carry out. West of Toronto, it seems necessary to supplement the work of spraying by banding the trees with burlap, or other material, giving the caterpillars a shelter in which to spin their cocoons, and then destroying them before the moths emerge. Where spraying and bandaging the trees are faithfully carried out, the Codling-moth is very materially reduced in numbers. But notwithstanding all that is done, the apples going to market every year are to a large extent damaged by this insect, and the unsightly appearance of the apple with injury on the side or at the calyx end reduces its selling value. We thought, therefore, that it would be advisable to have a discussion this afternoon upon this important insect pest, as in every conference of this kind some fresh points of value are sure to be brought out. It is no exaggeration to say that at least one-quarter of the loss sustained by fruit-growers every year is caused by the Codling-worm, and therefore it is a matter of great financial importance that we should learn the best and most effective methods of dealing with this pest.

Dr. Fletcher then described the proper methods of spraying fruit trees and applying bandages, and stated that, if fruit-growers would faithfully adopt this cheap means of dealing with the insect, they would save a very large amount of their income derived from orchards.

He next referred to the parasites which, in many instances, effectually keep down the insect enemies of crops. It often happens that a particular insect is extremely abundant one year while the next year few are to be found. This reduction in numbers is largely due to the work of parasites. Dr. Brodie, of Toronto, has for many years made a special study of the Codling-moth and of the parasites which affect it and a number of other injurious insects. He will tell us this afternoon what he has done in this direction and the results of his investigations. The introduction of a new parasite from some other part of the world is a very difficult matter and requires long continued efforts in order to secure satisfactory results. The introduction of the *Vedalia cardinalis* into California to destroy the Cottony-cushion scale is probably the only marked instance of successful work of this kind which has ever been brought about. It is hoped that the efforts now being made to establish a parasite of the Codling-worm in California will be successful; there are great difficulties to be overcome, and it will be some time before the parasite will become sufficiently numerous to control this enemy of the fruit. The study of parasites covers a field of very excellent and useful work, but up to the present time there have not been many practical results.

DR. BRODIE, before reading his paper, stated that he was a firm believer in the good results to be obtained through parasites. Dr. Bethune was the first person in North America to advocate the introduction of parasites to keep in check the imported insects that ravaged our wheat fields. His own recollections went back to sixty years ago when the Codling-worm was utterly unknown in Ontario; apple trees were then very large and productive. It was not till somewhere about 1858-1860 that it made its appearance. During the last ten years he had been pursuing rather carefully the study of this insect, taking in the larvae, breeding them through the winter and discovering to what extent they were attacked by parasites. He found it a very

difficult matter to procure a sufficient quantity of material for study, that is, of the larvae and pupae, during the different seasons of the year, and had never been able to get a satisfactory supply. Dr. Fletcher has told us that if the remedies prescribed, which are well known, were fully carried out, the insect would be kept well under control; he entirely agreed that these methods are the most rational and successful for combatting the ravages of the insect. Prevention by parasites has long been discussed and surprise has been expressed that their influence for good has been practically nothing. This failure, he believed, was largely due to the counter influence of secondary parasites which have an extended geographical range. He then read the following paper:

### PARASITISM OF CARPOCAPSA POMONELLA.

BY DR. W. BRODIE, TORONTO.

The all important problems of parasitism, as means for checking the increase of plant eating insects, have for more than half a century been much in entomological literature, and it seems that parasitism is recognized everywhere as the great power arranged by nature to check the rapid increase of plant eating species.

The parasitism of the Codling-moth has not been overlooked. Several species of primary parasites have been detected and identified, and surprise is often expressed that their influence for good is so little, we may say inappreciable. Now there may be several reasons for this; it may be the primary parasites we know are not the species arranged by nature to check the over increase of the Codling-moth. But one special reason I have detected is the presence of a secondary parasite, namely, *Dibrachys boncheanus*. This insect has a wide geographical range in Asia, Europe and North America, and although one of the smallest insects, exercises an immense influence in the world of insect life as a checking and balancing-up power. So far as known to us, it is without doubt an injurious insect, as most secondary parasites are.

On Aug. 28, 1905, I received from Mr. W. A. Peer, Freeman P. O., a small box containing 18 *C. pomonella* larvae and pupae. On Aug. 29, there emerged 2 moths, 1 primary parasite, *Pimpla pteralis*, and 12 secondary parasites, *Dibrachys boncheanus*. Sept. 20, 1905, a package from Stayner gave from June 2-10, 1906, 17 moths and one primary parasite, a *Pimpla*. Sept. 25, 1905, a package from Prescott, gave in June, 1906, 4 moths and 2 primary parasites, 1 *Pimpla*, 1 *Ephialtes*. I may say that I am indebted for identifications to Dr. Ashmead, of Washington, acknowledged to be the highest authority on parasitic Hymenoptera in the world.

During the many years in which I have been engaged in working out some of the problems of parasitism, I have found the primary parasitism of the Codling-moth to be about 0.5 per cent. No doubt it would be much greater were it not for the presence of the secondary parasites. In a further pursuance of the many interesting, practical and important problems presented, such as the life histories and relations of the primary and secondary parasites known to infest the larvae and pupae of the Codling-moth, and the relationships of these to allied species, preying abundantly on numerous species of Tortricidae, more or less common in open woods and thickets



everywhere throughout the Province, a careful comparison of the hosts and habits of our native species with closely related foreign ones would be of very great value. This might result in the importation of species more potent for good than our native ones.

In order to arrive at a satisfactory solution of the many problems involved in the investigation of this subject, an ample supply of material, larvae and pupae of the Codling-moth, must be at hand at all seasons, collected in many localities throughout the Province.

Surely the magnitude of the interests involved, and the rational claims of the indicated scientific method are such as to justify a sufficient effort by entomologists and fruit growers in determining the efficacy of parasitism in effectually overcoming the Codling-moth pest.

DR. BRODIE went on to say that the parasites he referred to are well-known, having a wide range over the United States and Canada. He had obtained them from the north, east and west of Ontario. The secondary parasite is exceedingly small, less than one-sixteenth of an inch, and on looking back he thought that his precautions were not sufficient, and that these minute creatures may have escaped detection. In pursuing an investigation of this kind, it is necessary for the worker to carefully fix his jars or bottles in such a way that these very small insects may not escape, but be retained for observation. The jars used should be small, but yet large enough for the atmosphere not to be too moist; they may be covered with cheese-cloth or some other thin material. This is a very important subject and should form an attractive field for work, affecting as it does our largest fruit industry.

PROF. HUTT said that he had travelled over a considerable portion of the Province this summer and found the Codling-worm exceptionally bad, especially in the Niagara district and the eastern part of Ontario. In some orchards half the crop was destroyed. It was now making its appearance in Algoma, and had this summer made some headway on St. Joseph's Island. It needs careful watching in order to keep it in check, as it is covering all sections where apples are grown. If parasites are of use in reducing the numbers of the pest, they are not increasing fast enough to control it to any extent. Something more than parasites is required, and that is the employment of the established remedies by the fruit-growers themselves.

MR. C. W. NASH said that the question of dealing with the Codling-worm was one of the greatest possible importance. As matters now stand, we are simply covering the ground with trees that to a great extent give us little in return. The remedies spoken of by Dr. Fletcher are certainly very easy of application and always show good practical results, provided that these remedies are applied thoroughly and at the proper time. The great difficulty that we find in dealing with the farmer is that he either does not believe in the practicability of these remedies, or he does not apply them just when he should. In the first place, with regard to spraying, as referred to by Dr. Fletcher, some men will spray their trees just when they happen to have the time to do so, without regard to the state of the fruit, or the tree, or the stage of the insect. In many cases where spraying is done at the wrong time, it is just money thrown away. If spraying is to be efficacious at all, it must be done before the larva has entered the apple. To catch them just at that particular time requires observation and the exercise of some little judgment. The codling moth deposits its eggs near or upon the little apple as it is first formed, about the time the petals drop from the blossoms. Those who have observed apples will have noticed that the little embryo apple stands erect upon the stem with the calyx expanded. A few days after

the petals have fallen, the stem curls over, the apple hangs down, and the calyx closes. If you spray after this has taken place, you are simply throwing away material, as there is no chance of its getting into that little calyx cup. To do your spraying, then, so that it should be efficacious, you should spray as soon as the petals fall, while the apple is erect. You then have a chance, a good chance, but even then nothing more than a good chance, of getting a small portion into the calyx cup. If you do, when the larva goes into the calyx cup and makes its first meal with the intention of entering the apple, it is very likely to be its last. Very little poison will be necessary at that time. The insect is remarkably weak and small. You cannot, however, hope to get a little poison into every apple on the tree, some will be missed and escape. But that is the point you must bear in mind, to spray at the proper time. Having done that and reduced very largely the number of larvae that are in your apples, you should supplement that treatment by afterwards bandaging the trees. If you do that, the probability is that it will not be a very great tax upon the product. A farmer in my neighborhood has a large orchard of old trees. He sprayed at the proper time, and he thought by so doing he had done everything that was necessary, and others had told him the same. I told him to bandage his trees as well, that it is much better to be safe than sorry, but he ridiculed the idea. So I took an old bag and did it myself, and eight days afterwards I went back. We took that bag off and there were seventy-two cocoons beneath the bag. These are the two remedies that are certain.

Another point to consider, and this is one that I think you should take into your deepest consideration, and that the government should enforce. It is that every man who has apple trees should be compelled to take precautions against the Codling-worm. A man who has large interests at stake will undoubtedly make some effort to protect his property, but the man on the small village lot with a few straggling trees—what does he care? The result is that these few scattered trees here and there enable cocoons to mature in a sufficiently large proportion to provide codling-moths for the whole Province. It has come to this, that unless a man will take care of his trees he should not be allowed to have them. I have tried myself for very many years to find out if there is any parasite affecting the codling-moth likely to be of any service. I have consistently failed to do anything of the kind. It was very rarely that I ever found a parasite. It may be that in some sections and in some seasons they are abundant. The parasites will have to be more abundant to show their effects, but so far as the codling-moths are concerned, I think you will have to look to your own efforts to reduce them. The very nature of the moth makes it almost exempt from any attack by insect parasites. It is practically exempt from any injury by outside enemies. In the pupa stage it is destroyed by birds. If we had more trunk-cleaning birds the orchards would have fewer codling-moths. You should take into consideration some means of compelling persons who maintain apple trees to look after them, or else see that they are prevented from keeping them.

DR. FLETCHER said that the experience in this country of trying to control people by legislation proved that such efforts were almost entirely useless. Now, the question of whether it is worth while to spray or not is one, I think, I need not discuss. All evidence and statistics show that it does pay to spray, and instead of losing 75 per cent. of the crop you can save it, as an average. At most the cost of spraying trees the number of times that it is necessary is less than 25 cents for large trees, and the number of bushels you will get off them will more than pay that expenditure many



times over. The present year, with a short crop in many sections, shows that the benefits to those that have sprayed will be enormous, and these are just the years when the work is most effective. The crop is small, it requires less expenditure for handling and shipping, and more than that, the sample is finer. When orchards are properly sprayed one inspection is sufficient to, at any rate, gain the sympathy of any fruit grower with spraying. He will spray every year after that. As to the advantage of spraying an orchard regularly, the benefits are very marked. At Ottawa, the horticulturist at the Experimental Farm now knows that he cannot afford not to spray. He has learned now to spray effectively, and the advantages are shown by the fact that for the past eight or ten years the codling-moth is almost unknown in these orchards, and I can get no specimens there. How far do you think I have to go to get specimens of the codling-moth? Just beyond a sixty-foot row of trees. I cannot find any codling-moths in our own orchards on the Farm, but need only go to these trees outside to get all I want. That shows the local benefit to the man who sprays, and it shows that although the codling-moth flies, it does not fly to such long distances as to impair the benefit to the man who sprays; while he who does not spray must pay the price that his loss entails.

In addition to the benefits from the remedies already referred to, it is most advisable to exercise the greatest care in examining and cleaning out any barrels or cases used for packing fruit which are brought in from outside sources and which may have contained infected fruit, as these may contain cocoons of the codling-moth. He had now at Ottawa cocoons of this insect with larvae still unchanged which were spun in July, 1905. A very few moths emerged in August, 1905, many in June, 1906, and some would not emerge till the spring of 1907. This, he thought, was a new fact in the life-history of the insect.

MR. G. E. FISHER: In regard to treating any troublesome insect, I always find it worth while to look for a remedy. With the farmers there seems to be a difficulty about spraying. As a rule, fruit-growers do not like to spray, and a great many do not spray, and the reason is because they have never done it. Now, I am a little surprised that in all this discussion regarding the codling-worm no reference has been made to the hog remedy. In a large orchard that I am familiar with, there are 2,000 apple trees in bearing, and there are any amount of moths. As a rule, an apple tree can well spare some of its fruit. The trees are better without it. Those apples that are attacked will fall to the ground, then we want about fifty hogs in an orchard of ten or twenty acres to follow up these apples and pick and eat them, and so destroy the worms. Dr. Fletcher has already explained the second brood that does the damage in this country. The first is a benefit by reducing the superabundance of fruit. If we can follow up those apples that fall, we have a remedy that is very easy to apply, will work out very satisfactorily indeed. A great many people seem to think that apples are of no advantage to hogs. I knew a man a few years ago, and he had a lot of apples and hogs. I told him to turn his hogs into his orchard, and he stated that he thought they would get too thin if he let them run, but finally he put them in, and the first thing he knew his hogs were too heavy to sell. They were beyond the limit. He has said ever since that there is an advantage in apples in connection with hog-feeding. I have found the hog remedy a very useful one, and perhaps you would scarcely think it, a hog has a very acute hearing, and if the ground is at all hard (we cultivate in the early part of the season), I have seen a hog's ears stand up when an apple fell and he would listen a moment and then go and find that apple, perhaps a hundred

yards away. Another thing in connection with hogs, they are pretty good scavengers. I have noticed hogs follow a caterpillar along the ground, and wait until he had caught up and then eat it. They clean up the insects very nicely.

DR. FLETCHER: You mean pigs, not old hogs, do you not?

MR. FISHER: I mean growing pigs.

DR. FLETCHER: Did you find that the pigs rooted too much?

MR. FISHER: No difficulty in that way. On different occasions the orchard was sown with peas and before the peas were ripe the apples were falling. The pigs not only ate the peas and apples, but plowed the ground as well.

MR. T. D. JARVIS exhibited some apples that were affected by the codling-worm, and spoke first of the good work performed by woodpeckers in puncturing the bark and extracting the larvae from their winter quarters. He then gave an outline of the life-history of the insect at Guelph, stating that about fifteen per cent. of the first brood of worms pupate in the summer, and the moths that come from them produce a second brood. The remainder pass over to the next year. There is thus at Guelph a very limited second brood.

DR. FLETCHER said that this percentage is very interesting as showing that there is a small supplementary brood of fifteen per cent. at Guelph. The locality is thus included in the western part of the Province where double-brooding to some extent exists. At Ottawa the proportion of early maturing moths is between two and five per cent., varying in different years. These moths lay eggs and a few larvae come from them. In the country west of Toronto—at Erindale on the Credit for instance—there are two regular broods, and very few of the first brood pass through the winter as caterpillars. These variations in different parts of the country are points which the Entomologist has to be on the watch for. He was much interested in Mr. Jarvis's account of the value that he placed upon the work of woodpeckers.

MR. PEART said: I have not been in the east, but in the western part of the Province, along the Detroit River, and going through the Niagara District, and also at Oakville, the Codling-worm was worse this year than I have ever before seen it. No particular pains had been taken with spraying as a rule, but in those sections where spraying was done at all carefully and at the right time, there have been marked results. It was owing to the scarcity of labor that spraying was not done. It is a very good object lesson to notice the effect in the district where spraying was practised, and compare it with those where it was neglected.

MR. ZAVITZ said that apple-growers in County of Durham had made enquiries regarding an insect that attacked the calyx end of the apple, but did not penetrate into the fruit. He wished to know whether there was any other insect that did this, or was it the codling-worm?

DR. FLETCHER replied that there are two other insects that attack the apple—the Plum-moth *Semasia prunivora*, Walsh, called also the Lesser Apple-worm in British Columbia, and a small caterpillar in the Province of Quebec. The latter bores under the skin and works near the surface, destroying the value of the apple for packing and shipment.

MR. JARVIS suggested that the insect referred to by Mr. Zavitz might be the second brood of the Codling-moth, but Mr. Zavitz thought not, as it simply worked around the head of the apple.

MR. FISHER: In regard to the right time to spray for Codling-moths, Mr. Nash said that the bee people were very anxious that the prohibition



should include the entire period of bloom. But the Government would not allow that, and the Act read "during the period of full bloom." It has been my experience that you cannot get after the codling-moth any too early, and it is desirable to spray before the blooming is entirely completed. We think this is correct.

DR. FLETCHER: I do not personally; have you seen the moth or eggs before the blossoms have fallen?

MR. FISHER: Yes, I think so.

DR. FLETCHER: At Ottawa the moth does not appear for 8 or 10 days after the blossoms have disappeared. In Nova Scotia I have found fresh eggs on apples as large as marbles.

MR. FISHER: We find better results from spraying before the bloom is entirely completed.

DR. FLETCHER: But you have not found the moth or eggs?

MR. FISHER: I think so.

DR. FLETCHER: That is an important point.

MR. FISHER: I have not been doing any packing of fruit, but those who do pack fruit say that our pears have no codling-moth this year, while apples are badly affected. Pears have escaped the attack. Is this the general experience?

MR. JARVIS: At Guelph we made examinations and found plenty of the codling moths in the pear, but did not notice whether it was less abundant than usual.

MR. FISHER: Our pears are usually pretty wormy, and it is very disappointing to have to throw out a nice large pear for the sake of a small hole. In previous years we have lost quite a large quantity.

MR. JARVIS asked what varieties of pears are most abundant this year? Is the Flemish Beauty free from worms?

MR. FISHER replied that there is a good pear crop this year, and that he believed the Flemish Beauty to be free. It might be of interest to mention that some Clapp's Favorite pears were shipped from Burlington to Glasgow this year successfully; they went through safely and sold at a high price.

DR. BRODIE: I should like to say that very few people have ever seen the eggs of the codling-moth. I have been fortunate enough to see them. The process is this, the egg was laid at the lower part of the apple; it is very small, of course. In about an hour after hatching the larva had moved to the upper part of the apple and commenced making holes. I think it has been mentioned that the larvae eat the skin of the apple. This is a mistake; larvae bite a hole in the skin, but do not eat the portions bitten out; they are laid aside and very little is swallowed. In about a day they are buried in the fruit and they immediately turn around (my own experience) and close up the opening with silk. Six species of parasites have been described in North America. These parasites thrust their ovipositors into the larvae through the opening made by the worm. We all know that there is about two or three days' difference in the emergence of the larvae from the egg. A large number, say 10 or 20 per cent. perhaps, will come out in the beginning and another proportion at the end of the week. If you wished to follow it up, you would have to be spraying continually. The larvae do not emerge all on the same day, perhaps not in the same week. Larvae that have come out of the same brood will be apt to emerge at different times.

DR. FLETCHER: The time of egg-laying and hatching is a very important point. The old accounts state very positively that the egg was laid in the calyx of the apple, and that in spraying you had to get your Paris Green into that cup. Later observations by Professor Washburn, in Oregon,

show that the eggs are laid on any part of the apple, and Mr. Simpson found as many on the leaves as on the fruit. The main benefit from spraying is not so much that you get the spray into that cup, because the caterpillars begin life both on the leaves and fruit. They crawl about a little and then penetrate the fruit. I have seen them when they first get into the cup of the apple; they have there a place to get a purchase to make the first hole, and they are able by pressure upon the opposite side to penetrate the skin. The egg is exceedingly minute and like a little fish's scale, perfectly flat and silvery. It does not stand up as a prominence on the side. To see it you must take the apple, hold it sideways, and look against the light and it will shine as a fish's scale. The young caterpillar hatches from that and crawls about on the apple. It is, of course, a very small insect and requires attention and time to see it. Most crawl towards the calyx end. With the second brood, the injury is often where two apples come together. At Ottawa we have come to the conclusion that with us the proper time to spray, if only one application is made, is not only not during the time of bloom, but not until even a week after the blossoms fall. The eggs are laid upon the young fruit. Nearly all apples when they are in the flowering stage are covered with a thick down, and the egg of the moth cannot be affixed to the side at that time. This is simply a matter of observation. The laying of the eggs certainly continues for over a week after the apple has formed. We never found an occasion where it was necessary to spray trees for the codling-moth during the time they were in bloom.

MR. CROW inquired whether there is any satisfactory way of killing the second brood.

DR. FLETCHER replied that bandaging the trees is the most effective method. By that means many caterpillars can be caught and destroyed. Spraying has some effect, but not so much as in the case of the first brood, because the foliage is so much thicker, rendering the work more difficult.

MR. JARVIS said that he had conducted experiments with bandages, and on one occasion found about 300 worms under a single bandage in two weeks' time. He began about the middle of July. The number of worms under a bandage varied very much.

DR. FLETCHER considered this too late for beginning and recommended the early part of the month for commencing to bandage. It was no doubt the most effective method of preventing injury from the second brood.

MR. CAESAR said that he had been this summer with Mr. Tweddle, who has an orchard of about 70 acres; and he was going to ask the same question as Mr. Crow. What time is it necessary to begin spraying to get the best results in preventing the second brood of the insects? They sprayed this orchard about three times in the early part of the season, and then did not spray again until about the 20th of August. He noticed in looking over the apples (Northern Spy) that they would probably have about thirty-three per cent., or more, of them affected by the moth. He wondered whether if they had been two weeks earlier this loss might have been prevented. As for bandaging, with an orchard so large it was almost impossible for them to do it. He thought they would do better to give the time to spraying. He wished to know what is the estimated cost of bandaging.

DR. FLETCHER: The question is a matter of expenditure and returns. If it pays, it does not matter if you pay \$1,000 to bandage if you make \$2,000 out of it. For the returns that you get from it, bandaging certainly pays, and it must not be forgotten that the very word spraying was unknown twenty years ago. Mr. Fisher will remember the first old Robertson pump, made at Grimsby. Now thousands of pumps are sold every year,



and more people buy them every year. Mr. Tweddle would have made it pay if he had bandaged his trees. The most important question was whether he could get the actual labor necessary. It certainly will pay if you destroy the caterpillars, for they destroy the fruit.

MR. JARVIS: Was the orchard sprayed the previous year?

MR. CAESAR: It was sprayed during the past three or four years. There are twenty-five acres in the orchard. It was little pruned and had been overrun with the canker worm. \$3,000 was made out of the orchard, so he thought it paid to spray. As to pears, he saw very few of his pears affected by the codling-moth.

DR. FLETCHER: The question of the exemption of pears this year is very interesting, and I can only suggest that it has something to do with the season. The effect of the seasons on insects is sometimes very much more apparent than on plants.

MR. JARVIS: What was Mr. Tweddle's experience in bandaging? Why has he given it up? Did he use burlap?

MR. CAESAR: The real reason was the difficulty in getting labor. Mr. Tweddle spoke to me and said he would like to bandage a number of his trees. We prepared a quantity of bandages of simply coarse sack material, with the intention of putting them on his trees; but we could not get men enough to go around the orchards, and the owner believed that he had been so successful in spraying in previous years that he could do without the bandaging.

MR. JARVIS: If there were 300 worms under one bandage in two weeks' time, it should pay to bandage. I found here at the College that bandaging was of very great benefit.

DR. FLETCHER: We have come to the conclusion that spraying is a good practice because we get clean orchards. But where there is a second brood, that must be supplemented by bandaging the trees. Mr. Fisher's experience that pigs and sheep, particularly pigs, destroy the infested apples and thus do a great deal of good in orchards is important. The time to spray will vary in different localities, and it will also vary with the different varieties of apples, as different varieties flower at different times. Mr. Fisher's experience is that it should be done as soon after the time of full bloom as possible. I find no advantage in that, and there is certainly a great disadvantage in spraying during bloom to those who keep bees, for direct experiments have shown that bees have been poisoned by sucking nectar from the flowers or drinking liquid from trees that were sprayed. Therefore, I for one think that the Ontario law is very well framed as it is, and that it should be made a misdemeanor to spray trees while in blossom; because bees are now an important part of the agriculture of Canada and particularly they are very useful to the fruit-growers in effecting the fertilization of blossoms. The time when to spray is after the blossoms have fallen, and then it must be done well. Cover the whole tree with spray and use a proper nozzle; the nozzle is as important as the material and the pump. To get a very fine spray it is desirable to find out the very best implement. We have in Canada an excellent pump, the Spramotor, with the movable discs, invented by Mr. Fisher, which is the best form of spray nozzle I have ever used. It enables one to use a very small quantity of liquid, for what is required in spraying is to have the liquid so fine that it falls on the trees as a mist or as a fine spray, and as soon as the spray begins to drip it is time to remove nozzle to another part in order to save material and injury to the trees. Arsenate of lead is highly recommended and its advantages are that it is in a finer state of division than Paris Green,

but the application must be three times as strong as Paris Green to get the same results; it also remains longer on the foliage because it does not wash off so easily. Being finer, it will remain in suspension better, and therefore arsenate of lead is, except for the matter of color, rather better than Paris Green. The danger is that in color it resembles other substances in domestic use, and therefore he did not like to recommend it for general use. It is very effective, and the mixture, if of proper strength, is safe in the hands of careful men, but it must be used carefully. It has been placed on the market in a convenient form under the names of Bowker's Disparene and Swift's Arsenate of Lead. It is a very powerful poison and very effective, but on account of the danger I have referred to, I do not recommend it except with the above named provisos.

DR. BETHUNE: I have employed the bandaging system a little and found it very effective indeed in catching the insects. The one great difficulty about bandaging is that it must be properly attended to. If you do not look after the bandages regularly, and at sufficiently short intervals, you are simply providing a most convenient place for the worm to conceal itself in and to change to the chrysalis stage. If the bandages are taken off at least every ten days and the larvae and chrysalids removed from the tree, it is a most effective and useful remedy, and is probably the only really good remedy that we have against the second brood of the codling-worm, with the exception of Mr. Fisher's plan of allowing sheep or pigs to devour the fallen fruit. Where a man has only a few fruit trees, he certainly ought to do that work himself and gather all that falls and destroy it. It is no use to gather a week after it has fallen. The drawback is that of labor and expense. I find that to examine properly a single bandage it takes at least ten minutes, because the larvae hide themselves under bits of loose bark and conceal themselves very thoroughly, and it requires a very good eye to find where the creatures are, so that it all takes time and care. No doubt that labor might be saved to some extent by having some convenient form of scraper which would scrape them off and save this troublesome work. You will, however, find under the bandages a considerable number of the worms they have not had time to conceal themselves, and these you can easily get rid of.

The question of parasites was brought before the Minister of Agriculture for Ontario in consequence of a paragraph in some of the newspapers in which he was credited with having discovered, or having available, a parasite to wipe out the codling-worm. He wrote to me on the subject and asked for information, as he was credited with a great deal more responsibility than he has any desire to have placed upon his shoulders. I told him that it was hardly possible to hope for an effective parasite, because the creature during the greater part of its life was inside the fruit and out of the reach of parasites. The only time for the parasite to attack the insect is during the very short period between the emergence from the egg and the time it is buried away inside the fruit, and then again it might be attacked after it has left the fruit and is proceeding to crawl to some convenient place before changing into a chrysalis. However, at his suggestion, I have been making inquiries both in California and at Washington and expect very soon to have some fuller information.

One other point which has been referred to I should like to emphasize, and that is the usefulness of birds in destroying these insects. A very large number of the larvae are destroyed in the winter time by woodpeckers, creepers and nuthatches. These birds ought to be encouraged in every way. Good work is also done by the chickadees and other birds. The



chickadees may be kept around an orchard or garden by helping them out with a little food during the winter. A good plan is to hang some suet in the trees.

The remedies then for the codling-worm are, first, spraying to get rid of the first brood, which can be exterminated, or nearly so. Spraying at the proper time and in the proper manner, as has been described this afternoon, should be resorted to, and also the removal of all fallen fruit. For the second brood, there is the bandaging. Then, after that come the woodpeckers and other birds. We cannot trust much to parasites, but we may be quite sure that our enterprising Minister of Agriculture will use every effort to bring the parasites, if they are found to be effective, into this country and make use of them here.

DR. FLETCHER said that parasites are not useless by any means. There are internal parasites as well as external parasites, and some of these parasites would be able to reach the worm in the apple. The larvae of the large Pigeon Tremex, which bores deep in the solid wood of maples, is parasitized by the two large Thalessas. There are several parasites which are also able to find out their hosts in the wood of trees. We do not know everything yet about parasites, but we must not say that they will not do this work. There are several parasites of the Codling-worm, as Dr. Brodie has told us, and when we find parasites in large numbers we may expect to obtain some results. To give an instance—one of the striking outbreaks at Ottawa was an aphid on birch trees, which was so abundant that the whole of the tree was covered with a black fungus, growing on the honey dew exuded by the aphid. The insect was abundant in June and July. Then we found that all over these trees affected by the plant aphid there were myriads of lady-bird beetles, and these beetles were so numerous that they wiped out the whole lot of aphids. We found ten to twenty of their pupae on a single birch leaf. What became of all those lady-bird beetles? Perhaps from a branch holding, say 50 leaves, we did not get 50 lady-bird beetles, but got a great many thousands of another parasite, forty to fifty of a little hypoparasite from a single pupa. Thus nature brings back again the balance by reducing the excessive number of beetles. Where one pupa produced a beetle, forty-nine never produced beetles but produced parasites. We do not know yet what can be effected by a Codling-worm parasite, but we must not give it up as hopeless. It is most hopeful. As Dr. Bethune showed us, though, we must not be too sanguine. With regard to the worms that burrow in the bark beneath the bandages, I find a brush with wire for bristles a convenient instrument for removing them. One was supplied with my furnace and I have made use of it to scrape off the worms on apple trees. Time can be saved with a proper implement, and a wire brush of this kind is good. The codling-worm does not change to a pupa inside its cocoon at once, but remains as a larva until just before it is going to emerge.

MR. SCOTT: How do you kill the cocoons in the burlap bandages themselves?

DR. FLETCHER: It is rather a troublesome matter. One man who bandages his trees has at the side of his orchard an India rubber wringing machine and runs them through that, or they may be thrown into scalding water. The burlaps are all taken off into a wheelbarrow and dropped into large open caldron used for sugarmaking; they are taken out at once and put back again. These are the only two methods known to me.

MR. NASH: I saw a man screw the wringer on the side of the wheelbarrow, and go through the orchard with it.

DR. FLETCHER: Hot water is probably the most effective method of killing the worms.

MR. JARVIS: Those left on the bandage and pressed, if very numerous, might spoil the bandage.

The hour for closing the discussion on the Codling-worm having arrived, the Chairman thanked those who had taken part in the discussion and called for the reports of the Directors of the respective districts.

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## REPORTS ON INSECTS OF THE YEAR.

DIVISION No. 1.—OTTAWA DISTRICT. BY C. H. YOUNG, HURDMAN'S BRIDGE.

The season of 1906 in the Ottawa District was marked by cold, wet weather in the early part and later by an excessive drought. The most noticeable insect feature of the season was the enormous numbers of plant lice which infested every plant. Trees were much reduced in vitality and many complaints were made of the leaves falling prematurely. In going through the woods in July it was almost impossible to collect a good botanical specimen, as the foliage of all low-growing plants was covered conspicuously with the honey-dew emitted by the aphides. The elm-leaf aphid and the maple leaf cottony aphid were particularly abundant. The foliage of many fine maples was noticeably disfigured by this latter insect. Birches also suffered very much from aphid. Some fields of potatoes were badly infested with a plant louse which Dr. Fletcher tells me he thinks is *Nectarophora solanifolia*.

In the early part of the season the usual occurrence of cutworms in gardens was noticed, the species doing the most harm being the Red-backed cutworm (*Paragrotis ochrogaster*) and the Black army-worm *Noctua fennica*. This latter cutworm works particularly in clover fields, but in the Ottawa district clover was winter killed during the open cold winter of 1905-6, and this fact probably accounts for their presence in vegetable gardens this year. Where applied, the poisoned bran mash soon stopped the ravages of these cutworms.

At the time dahlias and asters were coming nicely into flower, the Tarnished Plant-bug was very numerous and did a great deal of damage in destroying the flowers and forming buds. This is a difficult pest to treat. Spraying the plants with kerosene emulsion or whale oil soap or dusting them with pyrethrum insect powder, have given relief, but these remedies are not always satisfactory. In the early morning, when the bugs are not so active, many may be collected by beating them off the plants into an inverted umbrella, and then killing them by putting them into some receptacle containing water and coal oil.

The small white cabbage butterfly was not particularly in evidence in the early part of the season, but the late brood in September was very abundant and hundreds of the butterflies could be observed in some cabbage patches. Where these patches were neglected the green caterpillars soon did noticeable damage.

The Turnip Flea beetle was locally very destructive on a few farms near Ottawa. Some farmers who did not know the well-known remedy of Paris green and land plaster lost two or three sowings.



In asparagus beds, where the plants had been allowed to go to seed, many specimens of the Zebra caterpillar (Fig. 1) were noticed in September and early in October feeding on the leaves. This of course was due to the fine, almost summer weather which we have had this fall in Ottawa.

Among orchard insects the caterpillars of the Codling moth were abundant in orchards which were not sprayed, and later in the season the conspicuous nests of the Fall-Web worm were noticed in many orchards. This latter insect was also very bad in forests, ash, elm and other trees being much defoliated. In orchards these insects are not only destructive, but make the trees very unsightly. The remedy of cutting off the branches bearing the nests when these are small is such an easy one that I cannot understand why owners of good orchards allow this insect to work on their trees. A few colonies of the Red-humped apple tree caterpillar (Fig. 2) and the yellow-necked apple tree caterpillar were observed, but of course these did not do much harm. Cedars everywhere were much disfigured by the small caterpillars of *Argyresthia Thujiella*, a beautiful little white moth with bronzy bars on the wings. These minute larvæ feed on the tips of the shoots, causing them to die and lose their natural color.

I am glad to inform the members of our Society that I have been able to continue my collection of lepidoptera, most of my time being spent in working up our small forms, the micros. The specimens which I have brought with me will, I think, delight some of you. For these small moths the season has been very good at Meach's Lake, where I spent the summer, but speaking generally, I do not think the season was as good as 1905, at least in the Meach's Lake district.



Fig. 1.—(a) The Zebra Caterpillar.  
(b) The Moth (*Mamestra picta*).



Fig. 2.—The Red-humped Apple Tree Caterpillar (*Notodonta concinna*).

#### DIVISION NO. 2.—MIDLAND DISTRICT. BY C. E. GRANT, ORILLIA.

Though I have been very busy with town work this year, which has prevented me from doing a great deal with the net, I have observed that most insects have been unusually common; at the same time the rapid growth of vegetation has apparently reduced the destructiveness of some species. The chief complaint made to me in this neighborhood has been with regard to the Buffalo beetle, which has become quite a nuisance here. Dr. Fletcher was kind enough to send to the *Packet* newspaper of Orillia the best methods

of prevention; at the same time there does not seem to be any permanent remedy if you do not close your houses up in the spring time. The cutworms were very abundant and our old stand-bys, the codling moth and onion maggot were, as usual, destructive. The currant sawfly was also abundant this year, though for two years previously I left some bushes unsprayed and they were not at all eaten. Tent caterpillars were not numerous in the spring, but the Fall Webworm was to be seen nearly everywhere in September. The Tussock moths, though common as moths, do not do much harm as far as noticed here. There has been no complaint of the Pea weevil, though I have asked several intelligent farmers of the neighborhood to inform me of their ravages if noticed. Altogether I might say that this district has not been troubled with any serious outbreak of insect pests. Though the season has been an exceptionally fine and warm one, as I said before, I have not been able to give much time to entomology this year, but I have added one more *Plusia*, also *Harrisimemna trisignata* and *Arsilonche albovenosa* to my collection of local moths. I also have to report the second capture of *Junonia caenia* in Orillia.

DIVISION No. 3.—TORONTO DISTRICT. BY J. B. WILLIAMS, TORONTO.

The Tussock moth, as usual, did a good deal of damage to the shade trees in Toronto. About the middle of July the caterpillars began to let themselves down from the trees by a thread to the ground, and then ascended the trunks to pupate. Many of them were very small, and had a sickly yellowish look, and made poor little cocoons. Such specimens, I imagine, had been suffering from parasites, and on some trees the proportion of these small cocoons that seemed to come to nothing was very large. I saw a cluster of eggs on August 5th, but there do not seem to me to be as many eggs as usual on the infested trees.

The row of chestnut trees from which I had the cocoons collected last year, had some caterpillars on this year, but they were not nearly so numerous as on some neighboring trees, so that the destruction of the egg masses last year evidently did some good.

Apple trees around Toronto have been a good deal damaged by the Codling moth. In two orchards that I examined, one in the city and one about a mile outside, a very large proportion of the apples had been rendered quite worthless by the ravages of this pest.

I visited Niagara Glen in September, and found the Walking stick insects almost as numerous there as they were two years ago. Several large basswood trees had been completely stripped of their foliage by these creatures, and I noticed a Chestnut oak (*Quercus prinus*) some ten or twelve feet in height, with about two-thirds of its foliage destroyed, but the swarms of Stick insects that were upon it must, in a few days longer, have cleared off every leaf.

DIVISION No. 4.—HAMILTON DISTRICT. BY GEORGE E. FISHER, BURLINGTON.

In making my report of insect conditions in the Niagara District, which as a Director of the Entomological Society of Ontario I am supposed to represent, I can speak advisedly of my own immediate section and of such particulars as came to my notice during occasional visits to other parts of the district.



The phenomenal increase of the San Jose scale and of the Fall Web-worm and the attack of the Codling worm upon the apple crop, which was unprecedented in severity, were the most conspicuous features of the year.

The Curculio, aphid, potato beetle, asparagus beetle, cabbage worm and a host of others were everywhere present and ready to take advantage of any grower's neglect. Wireworms are making considerable trouble in garden land, and the Spruce Gall-louse is continually cropping up and is now known to be widely distributed. Tent caterpillars and Canker worms were not plentiful.

As our growers understand it, the Wireworms require three or more years to complete their life circle, and are in the pupa stage during the months of August and September, when they are easily destroyed by deep and frequent plowings and cultivation, but unfortunately the gardeners' land at this season is so fully occupied with growing crops as to render such treatment impracticable, and the pest continues.

Opinions differ as to the behaviour of the Spruce Gall-louse and the people are looking to the entomologists to determine its life history and habits definitely and to suggest a remedy. In the meantime they are picking off the galls, spraying and fumigating, thus holding it in check where this was done.

The Asparagus beetle has increased surprisingly. Small beds may be protected by the hen-and-chick method, but in large plantations involving several acres this is scarcely possible. There are instances of the young growth being covered with beetles before reaching marketable size, which disfigure both by gouging into it and by depositing their black eggs in large numbers. In this condition it is valueless.

Asparagus rust is also very troublesome. The only convenient remedy we know of for large blocks is careful and persistent spraying of the growth, after cutting is discontinued, with Bordeaux mixture heavily charged with arsenic, which will reduce both rust and insects. Some of our people have signified their intention to give up the struggle, which is to be regretted, as asparagus is generally appreciated, and under ordinary conditions is a source of considerable revenue to the growers.

Copper sulphate is being much used on potatoes in the form of Bordeaux mixture with arsenic, being first applied immediately after the first hoeing and at regular intervals until about five treatments are given. In this way blight is lessened, the vines retain their leaves, the crop is increased, the quality improved, and the bugs do not at any time become plentiful, for when larvæ are young they eat much more ravenously than they do later on and with less discrimination.

Notwithstanding the pains it takes to advertise its presence, the increase of the Fall Web-worm is very marked indeed, which can be attributed only to careless neglect on the part of the growers.

Grape-rot was prevalent in many sections and the free use of Bordeaux was found to be very effective in controlling it. Four or five treatments are necessary, the first treatment being given before the buds open. Where this early spraying was omitted the rot was much more general, especially on the red and white varieties, which in many instances when not sprayed early showed a waste of from twenty to fifty per cent.

There is no insect so widely distributed and so destructive to the fruit crop of the country as the Codling moth, which causes the loss of many thousands of dollars annually. This was pre-eminently a Codling moth year, the worst on record. In many apple orchards one-half of the crop was wormy,

and in some the proportion of injury was even greater. How to lessen the ravages of the Codling worm is an intricate problem for apple and pear growers who resort to various means. The most popular remedies are spraying with arsenic, bandaging, and keeping hogs and sheep in the orchard. Spraying, to be effective, must be done while the calyx remains open and before the fruit turns down, which will be useful only in reducing the first brood. Bandages should be applied early in June after the rough bark has been scraped from the trunk and large limbs. Being thus deprived of the natural shelter, the larvæ will continue their pilgrimage until they ultimately come to the snug quarters which the bandage affords, where they will remain. If these bandages be removed, and, after the worms have been destroyed, be returned to the tree at intervals of ten days and this be continued throughout the season and until after the crop is harvested, the evil will be materially lessened. Notwithstanding the great advantage which is sure to follow, these methods require more time and labor than the average farmer is likely to expend under existing labor conditions. In the Niagara district there are a good many successful apple and pear orchards standing in sod, and the owners unhesitatingly declare in favor of this treatment. Some cultivated formerly, but have abandoned cultivation. Others have part of their orchards in sod and part in cultivation, and say the trees in sod give the best results. They all agree that the grass must be kept pastured off very closely and never be allowed to get much top.

Hogs and sheep are usually kept in these orchards. The advocates of this method claim that their trees bear more regularly, that the fruit is more highly colored, and keeps better than that from cultivated trees, and that they keep the proportion of wormy apples well below ten per cent. I have observed that pruning has been carefully attended to in all successful orchards standing in sod.

I do not wish just yet to be understood as advocating sod in orchards, but have no hesitation in endorsing all of the advantage that is claimed to attend the presence of sheep and hogs. And further, this treatment is easy and much more likely to be conducted to a successful conclusion than either of the methods first mentioned.

Since its introduction into Canada never before did the San Jose scale enjoy conditions so favorable for its increase as were experienced during the past twelve months. The exceptionally mild winter suffered a much larger proportion than is usual to come through alive, and the hot, dry summer furnished ideal weather for rapid multiplication. It is needless to say that the scale made the best possible use of its opportunity and that the increase and spread were much greater than was ever before observed in this country.

This remarkable increase and the effect upon the trees were so easily seen that many growers question the possibility of combatting the scale successfully, and are taking no action. At the same time a few others, who have counted the cost carefully, and considered the advantage of both saving their orchards, and disposing of full crops on bare markets, have used lime and sulphur thoroughly cooked and freely applied for four or five years, with exceedingly gratifying results. These men did not shrink from the necessary expenditure, and besides maintaining their orchards in the highest possible condition of health and vigor, have realized greater net profits from them than they ever did before the advent of the San Jose scale, and this, too, in the midst of infested surroundings.



## EVENING SESSION.

Wednesday, October 10th, 1906.

A public meeting was held in the Massey Hall of the Ontario Agricultural College at 8 o'clock, p.m. Notwithstanding the inclemency of the weather, the first snowstorm of the season prevailing at the time, the large hall was nearly filled with an appreciative audience, including many of the students from the College and Macdonald Institute and some visitors from the city of Guelph. The chair was taken by Dr. Fletcher, the Vice-President, who opened the proceedings by congratulating the Society upon its successful removal from London to Guelph, and on the excellent arrangements that have been made for its library and collections by the authorities of the Ontario Agricultural College. He believed that the Society would fully appreciate its new home and find its usefulness was very greatly extended by its being placed in the midst of an enthusiastic band of young men and women students. When these completed their courses of instruction they would scatter all over the country, and carry with them much they had learned through the instrumentality of the Society; many of them, too, would become active members here and continue their connection after they had left. He looked forward with confidence to the bright days in store for the Society in which it would fulfil the duties that devolved upon it in a larger measure than ever before.

PRESIDENT CREELMAN gave a warm and hearty welcome to the Society and expressed the pleasure that he and all connected with the College felt in having its headquarters in their midst. Last year he was proud of the meeting, which was held here at the College, and wished that we might have it every year; now he was glad to say that this had come to pass and that these annual meetings would, as a rule, be always held here. This Ontario Entomological Society is a great Society, not so much in numbers as in the value of the work that it has accomplished, and which it continues to perform. He then spoke of the two systems of education and pointed out the advantages to be obtained from a combination of a knowledge of natural history with a good general education; this he considered much superior to the old-fashioned methods in which the pupil grew up without any knowledge of the common objects in the world about him. The practical value of Entomology to farmers and fruit-growers he did not think could be over-estimated; if put into figures, it would mean nothing below millions of dollars. He was especially gratified that the chairman had described their new quarters as "home," and trusted that it would continue to be their home for many a year to come. He then placed at their disposal everything that the College could offer for their comfort and convenience, and trusted that the meeting would be both profitable and enjoyable.

The chairman then called upon Mr. JOHN D. EVANS, of Trenton, the President of the Entomological Society, to read his address. This was followed by a paper by Prof. Lochhead, of Macdonald College, Ste. Anne de Bellevue, P.Q., on "What the Entomological Society of Ontario can do for the Ontario Agricultural College." In the absence of the writer, who was unavoidably prevented from being present, the paper was read by Prof. McCreedy. Mr. Paul Hahn, of Toronto, then gave a description of a canoe trip for entomological purposes in the Algonquin Park, and illustrated his remarks with a number of beautiful and interesting lantern slides made from his original photographs. A hearty vote of thanks was given to Mr. Hahn for his entertaining address. The proceedings of the evening were much enlivened by musical selections, both vocal and instrumental, furnished by the College Philharmonic Society.

## ANNUAL ADDRESS OF THE PRESIDENT.

BY JOHN D. EVANS, C.E., TRENTON.

When at the annual meeting of a year ago I referred in my address to its being the first meeting held at the fountain-head of Economic Entomology for the Province, little did we surmise that this noble Institution, the Ontario Agricultural College, would so soon become the headquarters of the Society.

We extended a hearty welcome on that occasion to Prof. Franklin Sherman on his accession to the duties of Entomologist, etc., on the staff of the Ontario Agricultural College on the retirement of his most worthy predecessor, Prof. Wm. Lockhead, but we little thought that his time with us would be so brief; but no doubt he was sadly missed in his old haunts, and rejoicings were much in evidence when he returned to his former position.

During his, Prof. Sherman's, short term of office he infused fresh blood into matters entomological and laid the foundation for a more complete and thorough system of collecting and maintaining a collection at the College of the Insect fauna of Ontario.

Upon the retirement of Prof. Sherman, who could be found as his successor more worthy or capable of undertaking the duties of Entomologist for the college than our most highly esteemed Editor, Librarian and Curator, Rev. Dr. C. J. S. Bethune, one of, if not the father, of Entomology in Ontario. When this matter was settled it became a most serious consideration for the welfare of this society into whose hands could be placed the care of the Library and collections. No one resident in London could be found who had the leisure and knowledge necessary for the proper performance of the duties inherent to the circumstances. It was suggested that a transfer of the Society's library and collections be made to Guelph, where accommodations for the same and the business of the Society would be provided by O. A. College authorities, rent free, and no change be necessary in the office of Librarian and Curator.

Some of the local (London) members of Council were adverse to the proposed change, suggesting that the transfer should be made to the Normal School in London, but others of the members being otherwise minded it was proposed to take a vote of all the members of the Council. Towards this end a circular letter was issued on the 4th day of May and ultimately replies were received from all the members when the vote stood *eleven* for the removal to Guelph and *four* against it; one member declining to vote, but suggested to lay the matter over until the Annual Meeting.

As the matter stood nearly three to one in favor of the removal, the undertaking was carried out during the month of August last without accident or mishap of any kind, and the Library and collections are now installed in their new, commodious and most desirable quarters, where they will be of inestimable value, not only to the students attending the college from year to year, but to all investigators of Economic Entomology, the College being the head centre, as it were, of that department in the Province, and where they will naturally congregate and look for assistance and inspiration.

Under the present conditions the usefulness of the Society will no doubt be greatly extended. It is hoped for and trusted that the number of members will be greatly increased through the instrumentality of the precincts of the



O. A. College, and a goodly number of the names added from year to year will continue on as active members long after they have severed their close connection with the College and drifted off to the four quarters of the globe.

An agreement has been entered into by and between the O. A. College and the Entomological Society of Ontario whereby the College provides ample accommodation for the Society's Library, Collections and business requirements, free of rent and completely under its own control in every respect, and subject to the withdrawal of the same by the Society at any time they may be disposed to do so.

This present occasion is the Forty-Third Annual Meeting of the Society. During all these long years this occurrence has come around regularly and without a break.

It was in 1863 (quoting from Rev. Dr. Bethune's "Rise and Progress of Entomology in Canada," printed in the Transactions of the Royal Society of Canada and read May 26th, 1898,) that the Society had its inception at a meeting held in Toronto at the residence of Prof. Croft.

In 1872 the headquarters were moved to London, Ont., where it has remained up to the present year. It is with feelings of great regret that we have to renounce old associations of such long standing, but a change was imperatively necessary.. It is hoped and expected that the move recently made will give a fresh impetus to the good works performed by the Society in the past and that it will now enter upon a new lease of life with its range of possibilities greatly augmented.

The quantity of new literature issued during the past year has been quite up to the standard. Not only the usual number of periodicals, magazines and reports of State, Federal and Provincial authorities have been regularly issued, but reference might be made to several new books, notably a new work on "Entomology," with special reference to its Biological and Economic aspects, by Dr. Justus Watson Folsom, in which are numerous illustrations, many of them being entirely new and of a high grade.

Also "A Glossary of terms used in Entomology," by Dr. John B. Smith, a much needed work which will prove of great service to very many entomologists.

We must all deplore the great destruction of property and loss of life occasioned by the appalling earthquake and fire in San Francisco in the early part of the year and express our heart-felt sympathy with the rescued and sufferers. This, no doubt, has been the occasion of the most extensive and irreparable loss the world has ever known of both private and public collections of Insects and of Libraries relating to the same.

The season of 1906 has been an unusual one. The winter was extremely mild, especially the months of January and February, with a very light snow fall. This was followed by a very dry, cold backward spring and a very wet June; July, August and September being noted for the excessively hot and unusually dry weather.

Insect depredations, so far as I have been able to ascertain, have been but slight or of little consequence. The pea-weevil has not given any trouble. Numerous instances of the nests of the Fall-web worm, *Hyphantria cunea*, Dru., have been observed on apple, elm and other trees, but no serious injury done.

In the vicinity of Frankford a number of cases occurred where isolated oak trees had been completely defoliated, caused probably by the Forest Caterpillar, *Malacosoma disstria*, Hub. Attempts were made to procure some of the insects, but too late; it was reported that they had died in large numbers, but from what cause could not be ascertained.

For some years past in several portions of the United States, notably New York State and New Jersey, also in Cuba, a war of extermination has been declared against the Mosquitoes by draining marshes and pools and also by covering stagnant water with a thin coating of petroleum, but now the fight is being carried to our own shores, for quite recently Mr. Henry. C. Weeks, Secretary of the American Society for the Extermination of the Mosquito, has been invited to Toronto to discuss and advise with those interested as to the best means of combatting the evil on Toronto Island.

## WHAT THE ONTARIO ENTOMOLOGICAL SOCIETY CAN DO FOR THE ONTARIO AGRICULTURAL COLLEGE.

BY WILLIAM LOCHHEAD, MACDONALD COLLEGE, STE. ANNE DE  
BELLEVUE, P.Q.

The removal of the headquarters of the Ontario Entomological Society to the Ontario Agricultural College is now an accomplished fact; and whether it was a wise move or not remains to be proven by the accomplishment of better work. I must, however, congratulate the O. A. C. on the new relationship, for I see many advantages that will come by the transfer to the College, and especially to the Entomological Department.

First of all, the Entomological Society of Ontario has won a reputation that is almost world wide; it is well and favorably known wherever insect life is studied. Its publications are valued by every Entomological investigator of note, and the best workers of North America contribute regularly to the pages of the *Canadian Entomologist*. For 43 years our Society has been in active existence, and the influence it has exerted during all these years on the progress of Entomology and education along Nature-Study lines in Canada has been very great and can scarcely be estimated.

For 43 years Dr. Bethune has stuck to the ship, and under his careful guidance the shoals and rocks and bars have been successfully passed. All honor to the men who have been associated with him for many years, viz., Dr. Saunders, Dr. Fletcher, Dr. Fyles, Mr. Lyman, Mr. Harrington and our President, Mr. Evans, for their most valuable and voluntary assistance. For 43 years the Ontario Entomological Society by means of its annual reports and special popular lectures has been educating the rank and file of the people into a knowledge of insect life.

I believe, therefore, that the transfer to the O. A. C. of the headquarters of a Society such as ours, which has done so much for Entomology the world over, will give an impetus to the study of insects at the College, and the Entomological Department at the O. A. C. will become better known on account of its intimate connection with the Entomological Society.

Again, the Ontario Entomological Society has all along been known as a great educational agency. It has taken the lead in educating the public as to the life histories of the injurious insects and the best means of controlling these insects. It has also done much to foster the Nature-Study Movement which means so much for the children. With its home at the centre of the agricultural education of the Province the Entomological Society and Entomological Department will be able to co-operate more effectively than was possible in the past. I look for a great forward movement in educational lines under the new arrangement.



Under the new partnership the Ontario Agricultural College can furnish the facilities and means of doing work, viz., its laboratories, insectary and funds for travelling. The Entomological Society can furnish the men and influence. The members of the Society scattered through the Province can be brought more closely into touch with the work of the Society and the Department. Their energies can be directed to better advantage by the central agency, Dr. Bethune and his assistants; and the season's observations will, therefore, be more definite and hence more valuable.

As you all know, the Ontario Department of Agriculture publishes and distributes for the Society its annual report which contains the papers prepared by its members. This report is edited by Dr. Bethune, and is printed early in the New Year, so that the recommendations made by the members may be of service to the fruit-grower and farmer the following year. Moreover, the records and observations which are often of great value, are distributed promptly to brother observers all over the world. Now the Entomological Department, with its head as Editor of the Annual Report, is happily situated in that it can place on record before the scientific world its observations of the year.

What an incentive to ambitious students to make careful observations during the summer holidays on their farms! No other Department at the College has such facilities at its disposal for the immediate publication of scattered records and observations which could not well be published in bulletin form.

Again, the Entomological Society brings to Guelph its large collections of insects which have been carefully looked after for many years. The specimens in the collection are valuable in that they represent Canadian forms mainly, and many are types of new species described in the *Canadian Entomologist*. The specimens have been carefully named by specialists, and are thus simply invaluable for purposes of reference. These collections now become, therefore, part of the collection of the Entomological Department and are at the service of that Department for research and lecture work. Advanced students and specialists in systematic Entomology will soon appreciate the worth of such collections when they undertake the study of special groups of insects. For many years the College had but a meagre reference collection, which condition of affairs rendered the work of instruction extremely arduous and time-consuming. Students outside of the College will no doubt be encouraged to send in specimens for identification and for help; and every outsider helped increases the reach and influence of the College.

Again, the Entomological Society's library, which also comes to the O. A. C., is one of the best specialists' libraries in Canada, or the United States for that matter. It contains an unusual large number of full sets of entomological journals obtained mainly by exchange with the *Canadian Entomologist* during the 37 years of its publication. Besides these, the library contains nearly all the Entomological publications—in English, at any rate—of the last 40 years.

For research and advanced work all the books and journals are at the disposal of the students and staff. Without them the staff was formerly much handicapped for lack of literature dealing with special groups of insects.

Connected as I was with the Entomological department of the O. A. C. for many years, and having labored hard under difficulties that are now largely removed by the transfer of the headquarters of the Entomological Society to the Entomological department of the O. A. C., I feel envious

of Dr. Bethune and Mr. Jarvis, especially when I see the opportunities for work that they now have. When I take a backward look over my own early work here and contrast the meagre facilities I had at my disposal, with the splendid equipment of books, collections, laboratories and insectary that are now at the disposal of the Entomological department, I am constrained to exclaim, "How the times have changed!" But while I envy Dr. Bethune, I must congratulate him and the College on the present happy state of things, and may he live long to enjoy the work that he has so much at heart! May the Agricultural Department and President Creelman continue their generous treatment of a Department that is now in such an excellent position to do much for the Province!

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## SECOND DAY'S SESSION.

Thursday, October 11th, 1906.

The Vice-President, Dr. FLETCHER, took the chair at 10 o'clock in the Biological lecture room of the Ontario Agricultural College. There were present throughout the day a large number of students from both the College and the Macdonald Institute, in addition to the members of the Society. The first order of business was the reading of the reports of the Council, the Branches of the Society at Montreal, Quebec, Toronto, Guelph and British Columbia, and of the Treasurer, Librarian and Curator, and the Delegate to the Royal Society. This was followed by a debate on the San José Scale.

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## SAN JOSE SCALE.

Mr. J. FRED SMITH, San José Scale Inspector for the Province of Ontario, was commissioned by the Department of Agriculture to bring before this meeting of the Society the prevalence of the scale on fruit exposed for sale in Toronto and elsewhere, and the question whether this might prove to be a menace to sections of the country where the scale did not already exist. In his opinion the danger is not very great, as the fruit, when consumed, is peeled and the rinds which bear the scales are thrown into the domestic receptacles for garbage, and thus the scales are destroyed without any opportunity of spreading to trees. The larvae cannot live long without food and when the rind is removed from fruit, it quickly dries up and the supply of liquid food for the insect no longer exists. He thought, however, that if the sale of scale-infested fruit was forbidden, it would compel the growers to take more trouble to keep their trees free from it. He considered that the scale was not spreading much, but where it did occur it was becoming a very serious danger to the orchards. In small centres of infestation it could be exterminated, and those interested should use every means in their power to get rid of it. It had recently spread to Font Hill and would no doubt spread further about the different centres if not properly dealt with. He exhibited a number of specimens of apples and pears more or less encrusted with the scale.

Mr. T. D. JARVIS said that he had found the scale on trees in private grounds in Toronto, and was of the opinion that the scale must have been introduced on fruit. At the time of the Exhibition three years ago he found



that 75 per cent. of the fruit brought into Toronto that came under his observation was affected with scale. The consumers of the fruit throw out the peelings and the insects may thus be enabled to reach near-by trees, especially through the agency of sparrows and other birds. He noticed that the apples sold by Italians in the streets of Toronto were badly covered with scales.

Dr. FLETCHER contended that there was no danger of an introduction of the insect by means of scaly fruit, as the peel to which it is attached would soon lose its moisture and the insect would die from want of food. To be successful, the skin of the fruit must remain moist enough to sustain the life of the insect; the female must be ready to produce her young; and the young must be able to reach a fruit tree—a combination of difficulties which it would be hard to overcome and which rendered infestation by this means extremely improbable, if not impossible. He did not think that many people would buy scaly fruit, and a grower would not venture to sell it, if he valued his reputation. He considered that it would be unjust and wrong to legislate against the sale of scaly fruit and thus injure a vast and most important industry.

Mr. CAESAR stated that the scales were sometimes carried by ants, and as ants were often attracted to fruit peelings, they might easily be the means of transporting them to trees. Scales were sometimes attached to lady-bird beetles also.

Dr. FLETCHER said that in Germany and in the United States there had been legislative enactments forbidding the sale of any fruit infested with scales, and much inconvenience and loss had been inflicted without any compensating advantage. He considered that it would be wrong to legislate against the sale of such fruit until we are quite sure that such restrictions are necessary to prevent the spread of the insect. We must not be alarmists and magnify the danger; the infested localities in Ontario are few and small, and the spread of the scale is not by any means rapid.

After some further discussion, in which others took part, the opinion of the meeting at the close of the debate was unanimous that it would not do at the present time to make any stringent regulations forbidding the sale of scale-infested fruit and thus hamper a very important industry. As there is so much doubt and difference of opinion regarding the danger from it, and our information is so limited, it would be unwise to frame any regulations till we are quite sure of the dangers to be guarded against. It was thought highly advisable that an inspection should be made of infested trees in Toronto and the origin of the scale upon them traced as far as possible. Young trees might have come from infested nurseries, but old trees, if attacked, must have received the insect in some other way.

The rest of the morning was occupied with the reading of a paper by Mr. Lyman on "A Search for a Borer," and an address on Gall Insects by Mr. Jarvis. The latter was illustrated by a large number of original lantern pictures and a profusion of specimens of a great variety of galls.

In the afternoon the remainder of the papers on the programme were read; they will be found in subsequent pages of this report. The election of officers for the ensuing year, 1906-7, was proceeded with and resulted as shewn on page 2.

The following exhibits of specimens were made by members during the meetings and attracted much attention:

By Mr. J. D. Evans.—A series of *Eucosma Scudderiana*, with parasites and super-parasites; some interesting Noctuids, and a species of Saw-fly which had been found injuring Virginia Creepers.

By Dr. James Fletcher.—Some remarkable forms of *Colias philodice* taken at Digby, Nova Scotia, by Mr. J. Russell, together with *C. interior*, *Grapta satyrus-marsyas*, *Thecla irus* and *T. laeta*, also taken at Digby by Mr. Russell. A pair of *Cænonympha kodiak* and *Erebia Magdalena* taken in the Yukon by Mr. Jos. Keele of Ottawa. Specimens of two species of wasps, *Vespa borealis* and *V. diabolica* which were reared at Ottawa from the same nest on three separate occasions. An interesting photograph of the webs made by the larvæ of *Ellopia somnaria* at Victoria, B. C., sent by Mr. E. A. Carew-Gibson.

By Mr. Arthur Gibson.—Living larvæ of *Cicindela repanda* and specimens of the Bean-weevil, *Bruchus obtectus*. Also some specimens of rare caterpillars inflated and larvæ of *Edemasia concinna* parasitized by *Limnaria Guignardi*, which has been very abundant this year.

By Mr. Paul Hahn.—Two cases of Lepidoptera taken in the Algonquin Park, Ontario, and a fine specimen of the tropical moth, *Thysania zenobia*, captured at Toronto.

By Mr. C. W. Nash.—Some specimens of Lepidoptera, including the Burdock-borer, *Papaipema cataphracta*.

By Mr. H. H. Lyman.—Two interesting cases of Lepidoptera, including some rare forms of micros, and specimens of *Gortyna appassionate*, *Grapta satyrus* and *marsyas*, *faunus* and *gracilis*; also a specimen of *G. satyrus* almost identical with the insect figured by Mr. W. G. Wright as *Grapta chrysoptera*, in his Butterflies of the West Coast of the United States.

By Mr. J. B. Williams.—Two living larvæ of *Ecpantheria deflorata*, which he had found feeding on violets in Niagara Glen, Ontario.

By Mr. C. H. Young.—A large case containing over a thousand specimens of Micro-lepidoptera, most exquisitely prepared for exhibition; the majority of the species included have been studied by Mr. W. D. Kearfott. Also a similar case containing many life-histories of rare Noctuids and other Lepidoptera; among them was a fine series of *Papaipema appassionate* and *P. Harrisii*, var., with larvæ; the former was reared from Pitcher-plant, and the latter from *Pteris aquilina*.

By Prof. Bethune.—The life-histories of the two asparagus beetles, *Crioceris asparagi* and *12-punctata*.

By Mr. T. D. Jarvis.—Several hundreds of examples of Galls on leaves, twigs, etc., in illustration of his paper.

By Mr. E. J. Zavitz.—A number of insects affecting Forest-trees.

At the close of the meeting a very hearty vote of thanks to President Creelman for his kindness in providing every facility for carrying on the sessions in the College buildings was unanimously adopted.

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## REPORT OF THE COUNCIL.

The Council of the Entomological Society of Ontario begs to present its report for the year 1905-6.

The forty-second annual meeting of the Society was held, by kind invitation of President Creelman, at the Ontario Agricultural College, Guelph, on the 18th and 19th of October, and was attended by a large number of the students as well as by many members from a distance. The Society was also favored with the presence of Professor J. B. Smith, State Entomologist of New Jersey, a distinguished entomologist and an honorary member of the Society, and of Mr. C. C. James, Deputy Minister of Agriculture for Ontario.



During the first afternoon the reports of the directors on the noteworthy insects of the year in their respective divisions were read and discussed; papers were also presented by Dr. Fyles and Mr. H. H. Lyman on the Tussock Moth; by Prof. Sherman on Entomological conditions in North Carolina, and by Prof. Lochhead on the experiments made during the year against San José scale.

In the evening a public meeting was held in the Massey Hall at the College and was largely attended. Addresses of welcome were given by President Creelman and Mr. B. Barlow, representing the Wellington Field Naturalist Club. These were followed by a very interesting account of the Mosquito work in New Jersey, illustrated with a large number of lantern slides from original photographs and drawings, by Prof. J. B. Smith. The second day was occupied with the election of officers and the reading of reports from the branches, as well as a number of papers on a variety of important entomological subjects.

The 36th Annual Report on economic and general Entomology was duly presented to the Legislature of Ontario, and was printed and distributed at the beginning of February—a much earlier date than usual. It contained 143 pages, illustrated with 74 figures in the text, and contained in addition to the papers already referred to, the following articles: "Insects as Nature Studies," by Prof. McCready; "Forest Insects" and "The advantages and disadvantages of the Canadian Entomologist," by Dr. Fyles; "Orthoptera and Odonata from Algonquin Park," by Mr. E. M. Walker; "Butterfly Collecting in Canada," by Mrs. Nicholl; "Insects Injurious to Canadian Crops in 1905," and the important "Entomological Record for 1905," by Dr. Fletcher; "Injurious Insects of the Flower Garden," by Mr. A. Gibson; "Forest Entomology," by Mr. E. J. Zavitz. "The Phlox Mite," the "Blue Spruce Saw-fly," and the "Bumble-bees that Fertilize the Red Clover," by Mr. T. D. Jarvis; "Injurious Insects of 1905 in Ontario," by Prof. Lochhead; a similar paper by Dr. Fletcher; and "Notes on the Season of 1905," by Mr. C. Stevenson.

*The Canadian Entomologist*, the monthly magazine of the Society, has been regularly issued. The 37th annual volume was completed in December last and ten numbers of volume 38 have now been published. The volume for 1905 consisted of 427 pages and was illustrated with seven full-page plates, one of which was coloured, and 29 figures from original drawings. The contributors numbered 62 and included writers in Canada, the United States, England, Jamaica, and the Hawaiian and Philippine Islands. The articles are largely scientific and include descriptions of ten new genera and 161 new species and varieties. There is also a series of articles on "Popular and Practical Entomology," which render the magazine more interesting to those who have not yet entered upon a systematic study of insects. It is hoped that more of those competent to write will assist in maintaining this department of the magazine.

During the winter months fortnightly meetings were held in the Society's room at London, at which a variety of addresses were given on popular scientific subjects. The attendance was not as large as might have been expected in a city with such a considerable population and the seat of a university.

The reports from the Branches of the Society at Montreal, Quebec, Toronto, British Columbia and Guelph are highly satisfactory and show much enthusiastic work on the part of the members.

At a meeting of delegates from the various Entomological Societies of the United States and Canada, held at Cornell University during the summer session of the American Association for the Advancement of Science,

our Society was represented by the Rev. Dr. Bethune. Measures were then taken for the formation of a general society to include entomologists of every grade in North America, and a preliminary constitution was drawn up which will be submitted to a meeting to be held in New York during Christmas week.

The most important event of the year as regards our Society was the removal of the headquarters from London to Guelph. Early in May, the President, Mr. J. D. Evans, sent a circular letter to all the members of the Council setting forth the reasons which led to the proposed removal and asking for their opinions on the subject. In a second letter, dated June 18th, he announced that he had received replies from all the members of the Council and that the vote stood in favor of the removal, eleven, and opposed to it four—one member abstaining from voting. He therefore declared that, as the vote in favor of the move was nearly three to one, the decision for the removal to Guelph was carried.

The Society's lease of its room in the Public Library building at London terminated its second year on the 1st of September, and another tenant was prepared to take over the premises at that date and relieve the Society of the remainder of its term of occupancy under the lease. It became necessary, therefore, to carry out the removal before the end of August. The books and collections forming our Library and Museum were carefully packed and brought to Guelph, and are now placed in their new quarters in the Library and Biological Buildings of the Agricultural College. The cabinets with their contents received no injury whatever in transit and are now conveniently arranged for reference in a part of the College Museum assigned solely to them. The Society's books and other printed matter are in a series of stacks in the fire-proof Massey Hall Library building and are kept entirely distinct from those belonging to the College. All the property of the Society continues to be under the control of its own officers and subject to any regulations that they may adopt. A written agreement to this effect between the College and the Society has been executed and a copy is appended herewith.

Much regret is felt by all the members of the Council, and no doubt by the members of the Society in general, that the headquarters should be removed from London, where they were established in 1872. Unfortunately, interest in entomology has almost entirely died out in London, and there seemed to be no one there available for the supervision and care of the library and collections. The sections also of Botany, Ornithology, Geology and Microscopy had, one after the other, ceased their active operations, and no meetings of any of them have been held during the last two years. Under these circumstances, it seemed to the majority of the Council that a change was imperative, and that a removal to Guelph would be in the best interests of the Society, as well as in accordance with the wishes of the Ontario Department of Agriculture. There is already in Guelph a flourishing branch of the Society with a large and active list of members. During the second and third years of the College course attendance at lectures in Entomology is compulsory, and in the fourth year some of the students specialize in the subject and make it a serious and scientific study—these naturally become active members of the Society and will continue their connection with it after they leave the College and scatter over the country. There will also be at Guelph a continuity of work and interest through the permanent staff of a Professor and Lecturer. The books and specimens will be much more largely consulted and the usefulness of the Society greatly extended. It is therefore believed that the removal, which has lately been effected, will conduce to the best interests of the Society.



The Council wishes to put on record its great gratification that one of the oldest and most highly esteemed members of the Society, the Rev. Dr. C. J. S. Bethune, has been appointed to the important position of Professor of Entomology at the Ontario Agricultural College. Dr. Bethune's wide knowledge of entomology and his long experience in teaching fit him eminently to fill this chair, with honour to himself and great advantage to all students who may attend his lectures. Special arrangements have been made with the Government and the President of the College, by which Dr. Bethune's services will be continued to the Entomological Society in the general supervision of its Library and in editing *The Canadian Entomologist*.

It is with much regret that the Council has to record the death of Baron C. R. Von Osten Sacken, one of our earliest honorary members, which took place at Heidelberg, Germany, on the 20th of May. This eminent Dipterist was born at St. Petersburg on the 21st of August, 1828, and for many years was attached to the Russian Embassy in Washington and afterwards was Consul General for Russia in New York. During the twenty-one years that he spent in America he prepared and published a number of works on the Diptera, and to him is due entirely the first scientific knowledge of the North American species belonging to this great order of insects.

We have also to deplore the loss of one of our oldest London members, Mr. Benjamin Green, who for many years took a deep interest in the Society and was a regular attendant at the meetings of the Geological Section. Though prevented by failing eyesight from doing any active work of late years, his interest in science continued unabated and he kept up his connection with the Society to the end.

JOHN D. EVANS, President.

#### MEMORANDUM OF AGREEMENT BETWEEN THE ONTARIO AGRICULTURAL COLLEGE AND THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Ontario Agricultural College, in consideration of the removal of the headquarters of the Entomological Society of Ontario, together with the Society's library and collections, from London to Guelph, hereby agrees to provide the Society with a separate section of the stacks in the Massey Hall building, for its library, and a room in one of its buildings for the Society's collections and other property: the books and collections, etc., of the Society are to be entirely under the control of the officers of the Society and to continue to be its separate property; they shall also be subject to any regulations that its council may draw up.

The College will provide this accommodation free of any charge for rent or supervision.

The Society shall be at liberty to withdraw from this arrangement and to remove its property at any time, on giving to the President of the College three months' notice of its intention to do so.

Dated this 6th day of August, 1906.

(Signed) G. C. CREELMAN,

President, for the College.

JOHN D. EVANS,

President of the Entomological  
Society of Ontario.

## ANNUAL REPORT OF THE MONTREAL BRANCH.

The 275th regular, and 33rd annual meeting, of the Montreal Branch was held at the residence of Mr. A. E. Norris, on May 14th, the following members being present: A. E. Norris, in the chair; H. H. Lyman, G. A. Moore, E. C. Barwick, G. R. Southee, G. Chagnon, A. Denny, A. F. Winn.

The minutes of the April meeting were read and confirmed.

The secretary read the following report of the Council:—

In submitting their report for the season 1905-06, the Council have pleasure in recording that not only has there been a continued interest in our meetings, but also that there is a growing desire in many directions for accurate knowledge of the habits of insects.

Meetings have been held monthly as usual from October to May, with an average attendance of nine, at the residences of various members. During the summer field-days were held on May 24th and July 1st at St. Hilaire, and Saturday afternoon outings were arranged for, but weather conditions interfered with most of these, and it is to be hoped that the field-day committee will arrange for similar short trips this summer, and invite all interested in natural history to join with us. The branch attended the Natural History Society picnic at Mount Johnson on June 10th, and presented the books for prizes in the Entomological Department, Mr. E. Denny capturing the first prize and Mr. Stevenson the second.

One new member has been added to our roll, Mr. G. M. Stewart, formerly of the Toronto Branch.

The following papers were read at the meetings:—

- A Talk on Butterflies and Moths, A. E. Norris.
- The Cotton-worm Moth (*A. argillacea*), A. F. Winn.
- Difference between the Sexes in Hemiptera, G. A. Moore.
- A Rare Longicorn (*Pachyta rugipennis*), G. Chagnon.
- Hemiptera having Rudimentary Wings, G. A. Moore.
- The Tussock Moth Situation in Montreal, H. H. Lyman.
- Notes on the Geometridae of Biddeford, Maine, A. F. Winn.
- An Account of the Annual Meeting at Guelph, H. H. Lyman.
- The Buck Moth (*H. Maia*), A. F. Winn.
- Wings of Hemiptera-Heteroptera, G. A. Moore.
- An Interesting Variety of *Lina Scripta*, G. Chagnon.
- Heads of Hemiptera, G. A. Moore.
- North American Theclinae, H. H. Lyman.
- Theclas of Great Britain and Ireland, L. Gibb.
- Canadian Theclas, A. F. Winn.
- The Deaths-Head Moth, Rev. Dr. Fyles.
- Notes on some Micro-Lepidoptera, A. F. Winn.
- Catocala Relicta, A. F. Winn.
- A Hunt for a Borer, H. H. Lyman.
- Notes on *Apantesis Vittata*, E. Denny.

But few additions have been made to the cabinet during the past seasons, and good specimens in any order will be very acceptable.

Mr. Moore has entered up in the Catalogue of Montreal Insects a list of Hemiptera known by him to occur here, making a useful addition.

A beginning has been made in forming a collection of portraits of our members, past and present, and those who have not already handed in their photos are again respectfully requested to do so.



The library has been added to by the receipt of the Reports from New York State, and also the Volumes of the Canadian Entomologist, which have been bound.

At the annual meeting at Guelph, the Branch was represented by Mr. Lyman, and Mr. Winn was elected as this year's delegate to the Royal Society of Canada.

The treasurer's report, submitted herewith, shows a balance to our credit of \$49.36.

Respectfully submitted on behalf of the Council,

A. E. NORRIS, President.

The reports of the treasurer and of the curator and librarian were then submitted and adopted.

The following officers were elected for the ensuing year:—

President—Geo. A. Moore.

Vice-President—E. C. Barwick.

Sec'y.-Treas.—A. F. Winn.

Curator and Librarian—L. Gibb.

Council—G. Chagnon, H. H. Lyman, G. R. Southee and E. Denny.

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## REPORT OF THE QUEBEC BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The ninth annual meeting of the Quebec Branch of the Entomological Society of Ontario was held at the house of the President on the 13th day of October, 1906.

There were present: The Rev. Dr. Fyles in the chair, Mrs. Fyles, Mrs. J. H. Simmons, Miss Fyles, Miss Bickell, Miss M. Johnstone, Miss Freeman, Miss Hamel, Mr. J. H. Simmons, Lt.-Colonel Lindsay, secretary-treasurer, and two guests.

Dr. Fyles congratulated the members on their re-assembling after the summer holidays. He then told of an excursion he had made through the border townships in the tracks of the Larch saw-fly, *Nematus Erichsonii*, Hartig. He learned that in all that section of the country there was not a first-growth tamarack remaining, and that most of the tamarack of a later growth were destroyed. A few young trees of the kind were growing in places; but a new growth of balsam, poplar, spruce and birch, varying with the nature of the soil, was occupying the broad stretches of land in which the tamarack formerly flourished.

Dr. Fyles exhibited a fine nest of the wasp *Vespa arenaria*, Fabr., which he had brought from the grounds of Mr. George Ramsay, of Little Village, P.Q. It had been built in an open field an inch or so from the ground and was supported by a few stout bents of grass and a small stem of *Aster cordifolius*, L. It resembled a round stone or a large puff-ball, and it contained a surprisingly large number of cells.

While he was examining it at Mr. Ramsay's residence, a fine female—the last of its occupants—burst from her cell and was quickly transferred to the cyanide bottle. This was on the 9th of September. The insect was a beautiful object, jet black with pure white markings; but when it was set up it soon lost much of its beauty: it had become greasy, saturated with oily matter. As the accumulated fat of the bear is its support through its long winter repose, so, probably, this super-abundance of oil in the female wasp is the provision of the insect until the opening spring.

Numerous insects taken by Miss Freeman at her country place at Lorette, P.Q., were also shown. Among them *Tropæa Luna*, L., *Autographa rectangula*, Kirby, *Catocala Briseis*, Edwards, and the handsome beetle, *Chalcophora Virginiensis*, Drury.

Miss Freeman discovered in an unoccupied room—one of the windows of which had been left partly open for ventilation—about a dozen specimens of the beautiful butterfly, *Eugonia j album*, Bois and Le Conte. They had evidently flocked to the room as to a safe refuge from winter storms.

The President exhibited seed of the larger Lady's slipper, *Cypripedium pubescens*, which had come to perfection in his garden. They were contained in a ribbed fusiform pod. To the naked eye they resembled brown dust, but under the microscope they presented a very interesting appearance. Each minute brown seed was attached to the inside of a finely reticulated transparent spindle-shaped capsule, which could be readily carried by the wind, and by this provision the seeds on escaping from the pod are widely scattered.

Lt.-Colonel Lindsay then gave a most interesting account of the Caddis fly frequenting lakes and streams. These flies are very abundant in August and not only the trout are eager to make them their prey, but insectivorous birds gather them with the same intent, so that between the crop of the bird and the maw of the fish—its Scylla and Charybdis—the unlucky insect finds it difficult to steer its course.

The officers for the coming year were then elected as follows: President, the Rev. Dr. Fyles, F.L.S.; Vice-President, Mrs. Richard Turner; Secretary-Treasurer, Lt.-Colonel Crawford Lindsay; Council, Hon. Richard Turner, J. H. Simmons, Esq., Miss Bickell, Miss Freeman, Miss Hedge.

A vote of thanks to the officers, to the hostess of the occasion, and to the authorities of Morrin College for allowing the Society the use of its rooms for its meetings, proposed by Mr. J. H. Simmons, and carried unanimously, brought the proceedings of a very pleasant meeting to a close.

CRAWFORD LINDSAY,  
Sec.-Treasurer.

#### REPORT OF THE COUNCIL.

The Branch now numbers 29 members.

The Secretary-Treasurer's report will be submitted to you and will no doubt be found satisfactory.

In the course of the year, four papers on Ants and one on Aphides were read by the Rev. W. W. McCuaig, and papers on the Tussock and Gypsy moths, European butterflies, Paper-making wasps, the Death's Head moth, and the Arctiadae of the Province of Quebec, by the President.

The Council regret the departure of Rev. Mr. McCuaig from this part of the country. A vote to that effect was adopted by the Branch.

Our thanks are due to the authorities of Morrin College for having continued to allow us the use of their rooms for our meetings.

CRAWFORD LINDSAY,  
Sec.-Treasurer.



## REPORT OF THE TORONTO BRANCH, 1905-6.

The tenth annual meeting of the Toronto Branch of the Entomological Society was held in the Provincial Museum on June 19, 1906.

The President, Dr. Brodie, was in the chair, and the following were present: Mr. J. B. Williams, Mr. P. Hahn, Mr. H. S. Saunders, Dr. Abbott, Mr. A. Cosens, Mr. Fraser, Miss Mosey, Miss Blackmore, and a number of visitors.

The following officers were elected:

President—Dr. Brodie.

Vice-President—Mr. Paul Hahn.

Secretary-Treasurer—Miss Blackmore.

Librarian and Curator—Mr. J. B. Williams.

Council—Mr. Ivy, Mr. Webb, Dr. Abbott, Mr. R. Hallam.

The Secretary read the following report:

Your Secretary takes pleasure in announcing a successful and profitable season's work. In all, eight meetings in the Museum have been held, and three excursions thoroughly enjoyed by those fortunate enough to be able to attend. The average attendance at the meetings was 10.

Many very instructive papers were read, particularly those of Dr. Brodie require mention, which dealt with insect pests and methods of dealing with them. Papers read during session:

"The Tent Caterpillar," Dr. Brodie.

"Some Recent Additions to the Society's Collection," Mr. Williams.

"Collecting at Niagara Glen," Mr. Hahn.

"Parasitism," Dr. Brodie.

"Insect Intelligence," Dr. Brodie.

"The Tussock Moth," Dr. Brodie (2 papers).

"A Temagami Trip," Mr. Hahn.

One evening during the session was devoted to specimens, and proved very interesting.

Donations to the Society's collection have been received during the past year from Mr. Hahn, Mr. Saunders, Mr. Fraser, and Mr. Williams. Some work has been done in arranging the Lepidoptera, and Mr. Fraser has undertaken to rearrange the Dragon-flies.

Publications have been received from Ottawa and Washington, from the Ohio and Connecticut Experiment Stations, and from New York State Museum, and a copy of "Butterflies of the West Coast" has been procured for our library.

The Treasurer reported a balance on hand of \$6.95.

Respectfully submitted,

E. BLACKMORE, Secretary.

## REPORT OF THE BRITISH COLUMBIA BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO FOR THE YEAR 1906.

The fifth annual meeting of the above Branch was held at the Queen's School, Vancouver, on January 26th, 1906.

The following members were present: Messrs. A. H. Bush, R. V. Harvey, R. S. Sherman, W. A. Dashwood-Jones, B. Marrion, J. Towler, R. Draper, F. Foster.

On the motion of Mr. Dashwood-Jones, Mr. Bush took the chair, in the unavoidable absence of the President.

The minutes of the last meeting were read and confirmed.

The Treasurer presented his report, showing a balance in hand, in cash and supplies, of \$15.50.

Messrs. J. R. Anderson and F. Foster (junior) were elected members of the Branch.

The retiring officers were re-elected for the coming year: President, Rev. G. W. Taylor; Vice-President, T. Wilson; Secretary-Treasurer, R. V. Harvey.

The Secretary announced that he had approached the Provincial Department of Agriculture with a view to obtaining assistance towards printing a small periodical giving an account of the work of the society. He read a letter from the Hon. R. G. Tatlow, definitely promising aid for one year.

A resolution was passed, accepting with thanks the offer of the Department, and the President and Secretary were empowered to arrange for the publication of a periodical, to be called the "Bulletin of the B. C. Entomological Society."

Two numbers of this Bulletin have already appeared, and the third is on the point of appearing. These numbers contained: Proceedings of the Branch; A Summary of the work done in B. C. up to date; Lists of interesting captures; General articles, and lists of various families of insects as they have been recorded in British Columbia. These comprise: Coccinellidæ (33 species), Buprestidæ (19 species), Cicindelidæ (15 species); in Diptera, the Tabanidæ (18 species), Bombyliidæ (23 species), Therevidæ (1 species), and a list of 28 species of Odonata. (Note by the Secretary.)

Mr. Dashwood-Jones then showed some interesting insects from St. Leon Hot Springs, Kootenay Lake, B.C., determined by Dr. J. Fletcher, including: *Basilarchia arthemis*, *Basilarchia disippus*, *Nomiades lygdamus*, *Erebis odora*, *Catocala briseis*, *Phengommataea Edwardsata* and *Sthenopsis quadriguttatus*.

Dr. Draper showed a fine series of *Lepisesia flavofasciata*, var. *ulalume*. The meeting then adjourned.

The spring meeting was held at Duncan's, on Vancouver Island, on April 19th.

The following members were present: Rev. G. W. Taylor (President), Messrs. A. W. Hanham, C. Livingston, E. M. Skinner, G. O. Day, T. M. English and R. V. Harvey.

The minutes of the last meeting were read and confirmed.

Messrs. F. Wolley-Dod, G. O. Day, and T. M. English were elected members of the Branch.

Mr. Harvey read a paper on the "Distribution of Insects in North America," calling attention to the far greater similarity between our fauna and that of Europe, than between the latter and that of eastern North America.

Messrs. Livingston and Skinner showed some rare Lepidoptera, the latter having a fine specimen of *Sthenopsis quadriguttatus*, from the Skeena River.

The meeting then adjourned.



## REPORT OF THE GUELPH BRANCH.

On the occasion of the forty-second annual meeting of the Ontario Entomological Society, held at the Ontario Agricultural College, Guelph, on October 18th and 19th, 1905, action was taken which resulted in the formation of a Guelph Branch of the Society.

This new Branch was organized with the following officers:

President—Franklin Sherman.

Vice-President—Richard Readwin.

Secretary-Treasurer—T. D. Jarvis.

Committee—Messrs. Sherman, Jarvis and C. R. Klinck.

An encouraging membership of 27 was secured, and the wisdom of the step was shown. The beginning augured well for live and enthusiastic work, and the most sanguine hopes have been fully realized.

During the year sixteen meetings have been held at fortnightly periods, alternating with those of the Wellington Field Naturalists' Club. The attendance averaged thirty and included visitors from the Nature Study classes of Macdonald Institute, and teachers and others from the city of Guelph.

At each meeting talks and papers were presented, which were occasionally illustrated with lantern views. Their nature will be indicated by the following classification which appears on the printed invitations sent out:

General Entomology.

Entomological Literature.

Economic Entomology.

Observations and Notes by Members.

At the conclusion of this one year's work the Branch was merged with the parent society whose headquarters are now at this place.

TENNYSON D. JARVIS,  
Secretary-Treasurer.

## REPORT TO THE ROYAL SOCIETY OF CANADA.

FROM THE ENTOMOLOGICAL SOCIETY OF ONTARIO, THROUGH MR. A. F. WINN,  
DELEGATE.

As Delegate from the Entomological Society of Ontario, it is my pleasing duty to report another year of steady progress, and that our membership is increasing very rapidly. At your last meeting the establishment of a branch in British Columbia was mentioned, and since then another had been formed in Guelph, Ont., where there are a number of active and enthusiastic entomologists.

The parent society in London, with its branches at Quebec, Montreal, Toronto, Guelph and Vancouver, and active members in every Province of the Dominion, is able to accomplish much that would be impossible if the sphere of work were limited to a more restricted area.

The last volume, No. 38, of our monthly magazine, *The Canadian Entomologist*, contains 426 pages—a contrast with the first modest one of 110 pages—and is illustrated with twenty-nine figures in the text from original drawings, and seven full page plates, one of the latter being a three-color process plate of moths, showing the beauty as well as scientific accuracy of this style of illustration. Among the sixty-two contributors to its pages, some are from such distant places as Jamaica, W.I.; Honolulu, and the Philippine

Islands. Eleven new genera of insects are described, and one hundred and forty-two new species. Articles on new species and varieties of Lepidoptera, by Dr. J. B. Smith, Dr. Wm. Barnes, Dr. H. G. Dyar, Prof. Fernald, Miss Murtfeldt, Messrs. H. H. Lyman, F. H. Wolley-Dod, A. Gibson, W. D. Kearfott.

Coleoptera, by Prof. H. F. Wickham, Major T. L. Casey, Messrs. Frederick Knab and Wm. Knaus; Orthoptera, by Messrs. E. M. Walker, and W. T. Davis; Hemiptera, by Messrs. J. R. de la Torre Bueno, E. D. Ball, D. Lange, and G. W. Kirkaldy; Hymenoptera, by Dr. W. H. Ashmead and J. H. Lovell; Diptera, by Mr. W. D. Coquillett, Miss C. S. Ludlow and Dr. Grabham. Life histories are given more or less completely of *Eupithœcia interrupto fasciata*, *Apantesis virgo*, *parthenice* and *rectilinea*, by Mr. A. Gibson; *Apantesis proxima*, by Dr. O. Siefert; *Gortyna thalictri*, by Mr. H. H. Hyman; *Delphastus pusillus*, by Mr. W. E. Britton.

A series of articles on Practical and Popular Entomology consists of the following:

"The Pear-tree Psylla and how to deal with it," by Mr. George E. Fisher; "Entomology in Schools," by Mr. H. S. Saunders; "How do Insects pass the Winter?" by Dr. James Fletcher; "Notes on Collecting Aquatic Hemiptera," by Mr. J. R. de la Torre Bueno; "Canadian Three-color Process Illustration," by Dr. James Fletcher; "The Struggle with the Codling Moth," by Prof. W. Lochhead; "Granary Insects," by Mr. A. Gibson; "A Method for Measuring Insects," by Mr. J. R. de la Torre Bueno; "The Buffalo Carpet Beetle," by Dr. James Fletcher.

Articles on Classification include a catalogue of the Aphidæ, by Mr. G. W. Kirkaldy; "The Bees of Oregon," by H. L. Viereck and others; "The Three Ranatras of the Eastern United States," by Mr. J. R. de la Torre Bueno; "Mosquito Notes," by Miss C. S. Ludlow.

Among the miscellaneous papers may be mentioned: "Observations on Lampyridæ," by Mr. Frederick Knab; "Notes on Types in the British Museum," by Mr. H. H. Lyman; "Remarkable Flight of *Corisa* (Water-boatmen)," by Mr. D. Lange; "Spiders of Rockport Cave, Mo.," by Mr. C. R. Crosby; "Influence of the Apidæ upon Geographical Distribution of certain Floral Types," by Mr. J. A. Harris; "Oviposition of *Bibio Femorata*," by Mr. A. H. Girault.

Book notices have appeared promptly of new entomological works.

The forty-second annual meeting was held in October at the Ontario Agricultural College, Guelph, with an attendance at some of the meetings of over one hundred, and the Society was favored with the presence of Prof. John B. Smith, State Entomologist of New Jersey. Reports were presented on the injurious and other insects of the various districts in Ontario, from the different Branches and Sections of the Society, and addresses and papers were given on a variety of subjects. The thirty-sixth Annual Report of the Society to the Ontario Government has been published, comprising one hundred and forty-four pages, and, as usual, contains a full account of the work of the previous year, and the papers read at the annual meeting, as well as numerous articles of an economic nature, giving to fruit-growers and agriculturists an account of injurious insects along with the best methods of attacking them.

Among these may be mentioned: "A Review of the Mosquito Work in New Jersey," by Dr. J. B. Smith; "Experiments Against the San José Scale," by Prof. Lochhead; "Entomological Conditions in North Carolina," by Prof. F. Sherman; "Reports on Insects of the Season 1905," by Prof. Lochhead, Dr. Fletcher, Dr. Fyles, Dr. Bethune, and Mr. C. Stevenson:



"The Tussock Moths," by Dr. Fyles and Mr. H. H. Lyman; "The Phlox Mite; the Blue Spruce Fly, and, On Bumble Bees that Fertilize the Red Clover," by Mr. T. D. Jarvis; "Forest Insects," by Rev. Dr. Fyles and Mr. E. J. Zavitz; "The Advantages and Disadvantages of the Canadian Entomologist," by Rev. Dr. Fyles; "Butterfly Collecting in Canada," by Mrs. Nicholl; "Orthoptera and Odonata from Algonquin Park," by Dr. E. M. Walker; "Insects as Nature Studies," by Prof. S. B. McCready; "Injurious Insects of the Flower Garden," by Mr. Arthur Gibson.

The library now consists of over eighteen hundred volumes, and a card catalogue according to subjects has been begun. The collections at London are open to the public three days a week, and advantage is taken of this opportunity, the number of visitors being increasing.

The branches are all in a satisfactory state, and our friends in British Columbia have decided to issue a quarterly "Bulletin," the first number of which has just appeared, and contains much information on the insects of British Columbia, particularly on the Coleoptera. It was felt that, as the members in that Province are so widely scattered, a medium of communication would bind them together, and we should like to see the members in the Maritime Provinces and also in the North-West follow a similar course, so that our Society could have a chain of branches from the Atlantic to the Pacific.

#### REPORT OF THE LIBRARIAN AND CURATOR.

During the year ending August 31st, 1906, thirty-eight bound volumes have been added to the Library, making the total number on the register 1900, also a large number of periodicals and pamphlets. Among the new books may be mentioned the Autobiography of the late Miss Eleanor Ormerod, LL.D.; Mr. A. G. Weeks's Illustrations of South American Diurnal Lepidoptera; the second part of Prof. Packard's Monograph of the Bombycine Moths; Mr. W. G. Wright's Butterflies of the West Coast of the United States; and Prof. Needham's May-flies and Midges of New York. During the year 38 volumes were issued to local members.

Owing to his appointment to the Professorship of Entomology at the Ontario Agricultural College, which took place on the 1st of June, the Librarian and Curator was absent from London during the last quarter of the Society's year. There are, therefore, few acquisitions to the collections to be recorded for this season, and the attendance of visitors during the summer months was almost entirely precluded. The following contributions have been made to the collections since our last report, and our grateful thanks are due to the kind contributors: 35 specimens of Lepidoptera, Coleoptera and Hymenoptera, by Dr. James Fletcher, Ottawa; 23 specimens of Lepidoptera by Mr. H. S. Saunders, Toronto; 118 specimens, representing 63 species of Manitoba Coleoptera, by Mr. Norman Criddle, Aweme, Man.; 22 specimens of Coleoptera, by Dr. A. H. R. Watson, Port Hope; 6 specimens of Coleoptera, by Mr. A. C. Baker, London, and a number of interesting specimens of various orders by Mr. J. A. Balkwill, London.

The removal of the Society's books and cabinets and other property from London to Guelph has been safely accomplished without any appreciable injury to the specimens, and all are now placed in their new quarters in the Massey Hall Library and the Biological Building at the Ontario Agricultural College.

Respectfully submitted,

CHARLES J. S. BETHUNE,  
Librarian and Curator.

## AUDITORS' REPORT.

FOR YEAR ENDING AUGUST 31st 1906.

## Receipts.

Bal. on hand Sept. 1st, 1905 .....	\$517 76
Members' fees .....	399 67
Sales of pins, cork, etc. ....	41 38
Sales of Entomologist .....	190 50
Advertisements .....	46 91
Interest .....	7 20
Government Grant .....	1,000 00

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 \$2,203 42

## Disbursements.

Pins, cork, etc. ....	\$ 26 95
Printing account .....	863 19
Rent .....	140 00
Insurance .....	24 00
Expense account, postage, mov- ing, etc. ....	204 37
Annual Meeting and Report.....	172 81
Library .....	12 35
Salaries .....	237 50
Balance .....	522 25

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 \$2,203 42

## A HUNT FOR A BORER.

BY H. H. LYMAN, M.A., MONTREAL, QUE.

On pages 154-156 of Vol. VIII of the *Canadian Entomologist*, published in August, 1876, appeared a paper, ostensibly by Dr. Leon F. Harvey of Buffalo, describing four species of new Noctuidæ, one being *Gortyna Appassionata*. The single type specimen had been received from Mr. E. B. Reed of London, Ont. I believe it was later claimed by Grote that he wrote Harvey's descriptions, and the type specimen was doubtless sent for name to Grote, and remained in the Grote collection and passed with it to the British Museum. On the rediscovery of the species, Grote disclaimed responsibility for the name, which he said was not Latin but Italian. Although there were a very few unrecognized specimens of this species in American collections, such as the collection of the American Entomological Society of Philadelphia, the species remained unknown save for its name in the catalogues and the one type specimen in the British Museum, though certain strongly marked specimens of *Marginidens* were identified with it by a prominent entomologist, who had seen the type on a visit to London. The description was accurate enough with certain exceptions which I, at least, fail to understand. The ground color of thorax and wings was stated to be "of a dark red color, the terminal space glistening red, subterminal space wide, concolorous purple." The last clause I consider misleading, as in many specimens the space from the t.p. line to the margin is of a uniform deep brownish red color, with only the faintest indication of the subterminal line, but I confess that in one of my specimens the space between the t.p. and s.t. lines has a purplish tinge which renders it darker than the space beyond, but the statement which I consider most incomprehensible is that "it is allied to *Nitela*, differs from it by the wider, rounder reniform, the three larger superposed spots on the t.a. line, the wider concolorous subterminal space and the more regular lunulate t.p. line."

In 1901 or 1902, Mr. Louis H. Joutel, as Mr. Bird has so interestingly told in Can. Ent. XXXV., 91-94, discovered an unknown larva of the genus, *Gortyna*, *Hydræcia*, *Papaipema*, or what you will, feeding in the roots of the Pitcher Plant (*Sarracenia Purpurea*) in the pine barrens near Lakewood, N. J., and Mr. Bird, having secured a supply of larvæ and food plant, was able to carry to maturity a goodly number of specimens, many of which, with his usual generosity, he distributed to important collections.



Fired with the ambition to secure this beautiful and rare species, I determined to take an early opportunity of seeking it in the locality whence came the type and so prolonged a business trip to Toronto into an entomological expedition to the then headquarters of our Society.

I left Toronto by the International Limited on the afternoon of July 9th, 1903, reaching London the same evening. After supper I called upon Mr. Dearness, who very kindly advised me as to the best remaining locality in which to look for the food plant, and promised to see Mr. Balkwill in the morning as to the most likely guide to the happy hunting ground. The next morning Mr. Balkwill called for me at the hotel and after some delay we succeeded in chartering a vehicle from a livery stable with a boy to go with us. We drove some distance into the country to a likely swamp, and then, leaving the vehicle in charge of the boy, Mr. Balkwill led the way to where the Pitcher Plants grew. There were no great masses of them, and probably they do not grow that way, but they were scattered about here and there through the swamp. I searched many but found no larvæ nor even any trace of them. Once I thought I had found one, as there was frass among the leaves near the root, but I found it had evidently dropped from some larva on the tree above, and the plant was without any borer. Now, I could never be mistaken about the frass of this species as it is reddish in color. After spending over an hour in the hunt without success, I abandoned the search and went with Mr. Balkwill to where cocoons of *Samia Columbia* had been found on larch in another part of the swamp, but saw none. We then returned to the city.

The next year I made a trip to Italy and so had no opportunity of looking for this species, but last year I determined to make another attempt, and as I also wanted to make a hunt at Kittery for *G. Harrisii*, I planned a four days' trip to Prout's Neck, Me., to search for these species, have a few dips in the sea, and a little golf. I left home on the evening of the 22nd July, and arrived at my destination before 11 a.m. the following morning, and in the afternoon set out accoutred for the chase. It is a good walk from Prout's Neck to the locality I was in search of, which I had not visited for nearly twenty years, and when I found the place my heart sank, as the area where the *Sarracenia* grew was so restricted, not occupying more than about a fifth of an acre between a wood which shut it off from the road and a salt marsh. However, I set to work, and as the result of about two hours' work secured three nearly mature larvæ. I then set out on a brisk walk to the hotel, happy at my success.

The next day was bad, as it rained all day, but towards five o'clock the rain stopped and the sun came out, and I sallied forth for a walk, though it was too late to go to the Pitcher Plants. After going for some distance along the road, I came to where some evening primroses grew and started a hunt for that lovely moth which used to be called *Alaria Florida*, but for the present is known as *Rhodophora Florida*, and secured quite a number of them asleep in the blossoms. I then turned off from the road across a stretch of meadow land to a drainage ditch along which the Poison Hemlock (*Cicuta Maculata*) grew abundantly, and in a very short time I had secured over a dozen practically mature larvæ of *G. Marginidens*, which Dr. Holland calls a rather scarce species, and only left off grubbing them up because I had filled up all my tin accommodation with the roots and enclosed larvæ, and I believe I could have easily gathered fifty.

The next morning I again visited the Pitcher Plants and devoted nearly two hours more to the search, and having secured two more larvæ and a newly formed pupa, which I took to be of this species and which was dis-

closed on pulling up a Pitcher Plant, I contented myself, as I did not want to clear the locality, and so kill the goose that lays the golden eggs.

This species will, I think, always be rare in collections as the difficulties in the way of securing any large number are so great. It requires most patient search to find them, and the root of the plant is so small that it takes two plants, at least, if not more, to nourish a single larva. They appear to enter the root from the crown among the bases of the petioles of the pitchers, and when all the edible part of one root is consumed they go to another, and I found several bored roots which had been abandoned. The beautiful crimson of the moth is evidently derived from the food-plant, as even the frass is red.

The plants in the locality visited by me grow among a very spongy moss and the larvæ when full fed appear to leave the roots before pupating, and in my breeding jars they pupated in the moss. Having provided myself with a sufficient supply of the roots to bring the five larvæ to maturity, I felt that that portion of my expedition had been successfully accomplished, and in the afternoon played a couple of rounds over the course of the Owascoag Golf Club with a good conscience.

The next morning I took the train for Kittery Junction, and from there the next train to Kittery Point, a very short distance, and then set out to walk. Morning and afternoon I must have tramped fifteen miles, but did not find a single plant of *Heracleum Lanatum*, the food-plant of *G. Harrisii*, and I found little except a further supply of *Rhodophora Florida* in the flowers of *Oenothera*. In the late afternoon I returned to Portland, and left for home by the night train, which I reached on the morning of the 27th.

The five larvæ duly pupated and were taken with me on the eclipse expedition to Labrador. Just before leaving, the pupa which I had found disclosed the imago and proved not to be a *Gortyna* at all. Of the five pupæ reared, one died, one moth was unable to emerge. I performed a delicate surgical operation and removed the pupa case, but the wings would not expand. One emerged and apparently hid among the moss and so escaped notice and damaged itself, so only two perfect specimens were secured.

POSTSCRIPT.—Mr. C. H. Young of Hurdman's Bridge, near Ottawa, who has been very successful in rearing *G. Appassionata* during the season of 1906, has favored me with the following notes through Dr. Fletcher:—

On July 12th, he found the larvæ in large numbers in a very wet swamp at the upper end of Meach Lake, Que., about fifteen miles north of Ottawa, at which time they were about half grown, but were full grown by the 25th. He noticed particularly that they were found only in the large plants and where the plants grew very thickly. According to Mr. Young's observations, the larvæ leave the root of the Pitcher Plant when mature, and pupate among the old decaying pitchers that are at least two years old and lie out among the moss. A very large proportion of the larvæ found by Mr. Young were attacked by a fungoid disease or by insect parasites of two species, one hymenopterous and the other dipterous.

## TWO INSECTS AFFECTING RED CLOVER SEED PRODUCTION.

By TENNYSON D. JARVIS, ONTARIO AGRICULTURAL COLLEGE, GUELPH.

The question of clover seed production is one of extreme interest to all who have the prosperity of agriculture at heart. While the seed cannot be considered as a staple money-crop in most sections, the use of the plant



has become so extensive and well-nigh universal, that the supply of the seed is becoming more and more a matter of paramount importance. The increased use of clover is indicated by the decided advance which has already taken place in the market price of the seed; and from this circumstance it is less than ever before keeping pace with the demand for it. It would seem the natural conclusion that interest should be stimulated in the production of such a remunerative commodity, and the fact that it has not been to a sufficient extent to control the price, suggests that there may be some offsetting factors to be taken into account—which is indeed the case. A reference to the annual reports of the Bureau of Industries of Ontario, reveals almost invariably a more or less unsatisfactory yield of clover seed. Furthermore, in examining carefully a large number of heads of clover here this fall, it was found that only 42 per cent. of the florets had produced seed, and undoubtedly the percentage is frequently much lower than it is this fall. It is not unusual for the yields to be so low as to render the harvesting unprofitable. In fact so uncertain and precarious a crop is it, that on a commercial scale it is a regular crop in only comparatively limited sections of Ontario, and in the other Provinces of the Dominion is but little grown. This general uncertainty of obtaining a reasonably full yield of seed is due to various causes. The plants on heavy or undrained land may be weakened by winter heaving; or on light soils their growth may be checked by summer droughts. The soil in some sections is so deficient in its retentiveness of moisture, that it is only in exceptional years that any considerable aftermath is produced. Insect ravages, and imperfect fertilization are two other causes. In the present article we propose to deal only with the two latter factors, showing how the presence of certain insects, and the absence of certain others, combine to affect adversely the yields of clover seed.

There are fully a dozen insects which do appreciable injury to some part or other of the red clover plant, but by far the most destructive to the seed is the Clover Seed Midge (*Cecidomyia leguminicola*). This insect has gained a wide range in America, and every year causes an immense depreciation in the yield of seed. It is estimated that the loss in Ontario ranges in various localities, all the way from 25 to 75 per cent. In an examination of 50 heads of clover late in September, when in all probability some of the midges had already escaped, 164 of their larvæ were found.

The insect which is responsible for this destruction is a minute two-winged fly, which appears in May or early June, and lays its eggs on the developing heads of clover among the bristles which surround the young florets. From these eggs, which are so small as to be almost invisible to the naked eye, the larvæ hatch and find their way down the opening corolla tubes to the future seed at the base. Small as they are they may be readily seen if placed on a white surface, and appear variable in color from whitish to orange-red. They feed on the doughy seeds until fully-grown, about the last week in June, when they emerge from the florets, and dropping to the ground transform to the pupal stage just below the surface. The pupæ develop to the adult fly in time that these may lay their eggs upon the second growth of the clover for another brood of the maggots. Thus both crops of clover are attacked, and after the damage is done the midges remain to go into hibernation until another year's supply of food is ready.

In order to combat this pest, it is only necessary to bear in mind the date at which the first brood is likely to pupate; and by cutting the crop a little in advance of this time destroy the whole brood, or by pasturing until danger from the first brood is past, prevent altogether the deposition of the

eggs on the crop. In accordance with this, it is now recommended to pasture closely until the month of June, when the clover may be allowed to grow for a late crop of seed; or if the crop has been left for hay, to cut this not later than June 20th, and obtain the seed from a second crop. Where these rules are observed, the injuries of the midge can be largely avoided. However, so long as some growers persist in disregarding them, it will find ample means of propagation; and so long the rest must expect to be obliged to maintain their precautions.

Having seen how the presence of one insect is so inimical to success in clover seed production, we will notice next how the presence of another is essential to the same.

Red clover, particularly the first crop, often fails to produce seed freely owing to imperfect fertilization. To understand this we need to notice two facts: 1. This plant is incapable of self-fertilization, and is therefore dependent on outside agencies for the performance of this office; and 2. The flower is so constructed, that very few of the agencies which operate in the cross-pollination of other flowers can take part in this case.

1. Inability to self-fertilize.

Many plants are known which, owing either to the structure of their flowers, or the ineffectiveness of the pollen on the pistils of the flower from which it is derived, do not self-fertilize. The red clover is an example as we shall notice presently. The flowers or florets of which the head is composed, have the four sets of organs which we find in other complete flowers. The corolla is a long tube having its lobes curiously fashioned so as nearly to close the opening or mouth. Within and enclosed in the lower lobes called the keel, are the pistil and surrounding it the monadelphous stamens. Notice particularly that the stigma of the pistil reaches up beyond the anthers of the stamens. Owing to this peculiarity, the pollen in falling does not usually come in contact with the stigma, and the plant evidently requires the intervention of insects for its pollination. That this is the case has been repeatedly proved by the exclusion of insects from the clover plants, with the result that under such circumstances no seed was produced.

2. Limited number of agencies which can pollinate red clover. Since insects do so much in carrying pollen between other plants, let us see why they are not equally useful here. We notice by examining a floret, that in order that pollen from another flower may come in contact with its stigma, it must be borne by some insect which in lighting on the keel, is heavy enough to pull it down so as to release the essential organs (pistil and stamens) from it; and then in probing with its proboscis for the nectar at the base of the corolla, will brush on to the stigma any pollen which may have become attached to it in visiting other flowers previously. The nectar, or sometimes the pollen which it bears, is the incentive which brings insects to a flower; but in the case of the red clover, the neck of the corolla tube is so long, that of the insects heavy enough to open the flower, only a very few have mouth parts long enough to reach the bottom. Bumble bees (*Bombus*) of various species, are practically the only insects which so habitually visit the flowers of red and mammoth clovers, as to be entitled to notice as a factor in their pollination. It is claimed that wasps often visit the flowers for honey, but instead of entering at the mouth in the orthodox manner, they cut a hole in the side within reach of the honey. Bumble bees have also been charged with this to some extent, and honey-bees will follow and utilize the holes thus made, but do not enter the flower; and so do not effect pollination. However, there is no doubt that bumble bees ordinarily visit the flower in such a way as to bring pollen to the stigma.



The honey bee seeking pollen and some other insects may occasionally be factors in this work, but cannot be considered as of any importance in comparison with the bumble bee. That these statements are based on fact may be strikingly seen in the experience of the New Zealand growers of clover seed. In that country attempts to obtain home-grown seed were scantily rewarded until, about 1885, the British Government introduced several species of bumble bees. These insects reproduced rapidly, and have effected a vast improvement in the yields of seed obtained. So manifestly beneficial did they prove, that the New Zealanders are now looking about for still further species which they might with advantage import. In the summer of 1905 a letter was received by the Ontario Department of Agriculture from the Canterbury Agricultural and Pastoral Association of New Zealand, seeking information as to what species of insects perform the service of pollination in this country, in the hope that some superior to what they have might be secured.

There are in America as many as fifty or sixty distinct and described species of bumble bees. Only a few of these, however, are sufficiently plentiful to be of economic importance. In an excursion through a clover field at Guelph this fall, three species were collected, namely, *Bombus fervidas*, *B. ternarius*, and *B. borealis*; the first of which was by far the most common. About Toronto another species, *B. consimilis*, is reported by Dr. Brodie as one of the most numerous.

Since the bumble bee plays such an essential role in connection with the production of clover seed, it will be worth our while to enquire into its life history and habits, for thereby we shall be enabled to arrive at some important practical conclusions.

Bumble bees, like the honey bees of domestication, have among them three kinds of individuals; the queens or females, the males, and the workers or undeveloped females. All these will be found in a colony in the fall; but on the approach of winter, the males and workers all perish, and the fertilized queens alone go into hibernation, to perpetuate the species another year. They remain in sheltered places, and in the spring those which have survived, set out separately to found each a colony of its own. The first care is to find a suitable place for the nest which is to be the home. They often appropriate deserted nests of field mice, and also construct nests for themselves of dried grass, or moss, or of wool, locating them in a depression in the ground. In this is stored a mass composed of wax, pollen and honey, in the latter part of which a number of eggs are at once deposited. Other cells similar to the first are added from time to time, and more eggs deposited as fast as their accommodation can be provided for. Owing to this method of procedure, the resulting comb receives the characteristically aimless construction with which we are so familiar.

As the young larvæ hatch, they feed upon the mass of pollen and honey in which they lie. When fully grown, each spins a lining to the cell which it has formed, and transforms to the pupal stage, finally emerging by gnawing its way out as a perfect bumble bee. After being thus emptied, these cells are not used again for the same purpose, but become the receptacles for the honey which is collected by the new brood of bees. For some time only workers are produced, and as they become numerous enough the queen is relieved from the various duties of collecting material, building comb, and so forth, all of which she has performed until now, and devotes her energies exclusively to the laying of eggs. Thus by the end of summer a populous colony may have been built up from the slender beginning of the spring. About this time, young queens and males also are produced, and

so when cold weather breaks up the colony, a number of queens are left to multiply colonies the following year.

This gradual increase from individuals to colonies of bees accounts for the greater yields of seed usually secured from a crop of clover late in the season. The flowers of the first crop opening in the latter part of June are not, as is sometimes supposed, any less capable of setting seed; but since they must be fertilized in order to produce seed, it follows that the yield will be in some proportion to the numbers of the bumble bees, and consequently greatest in the fall.

The practical applications which we may now make of the information we have about these two insects, the clover seed midges and the bumble bee, can be presented as follows. The life histories of both alike demand that a late crop of clover be used for seed; and therefore it is the utmost folly to strive to produce it at the time when Nature's odds are most strongly against us. The abundance of bumble bees, which is so much to be desired, may be materially augmented by a policy on our part of "letting live." An instinctive impulse which seems to be inherent in man, and persists long after he has lost the overflowing animal spirits of youth, makes the lot of the bumble bee a precarious one. In so far as we can, then, let us inspire youth with a considerate regard for the rights of the weak creatures, which are so often our friends; so that these thoughtless raids may appear to them despicable as they truly are, and if we ever find that the chance discovery of a bumble bees' nest stirs up in us some latent spirit of adventure, let us firmly suppress it as befitting a worthier occasion.

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## INJURIOUS INSECTS OF 1906 IN ONTARIO.

By C. J. S. BETHUNE, ONTARIO AGRICULTURAL COLLEGE, GUELPH.

Owing to my removal from London to Guelph in the early part of June, and subsequently the transfer of the property of the Entomological Society to its new quarters, my opportunities for outdoor observations have been somewhat limited during the past summer. I have, however, received a large number of enquiries, generally accompanied with specimens, from various parts of Ontario, and frequently visitors to the College have brought injurious and other insects for identification and information. In this way I have been enabled to learn something about the most troublesome insects of the season and their distribution throughout the Province. The extensive gardens, field-crops and plantations on the College premises have also afforded convenient places for the detection of injurious species. There has been no one great outbreak to mark the year, but many forms have been more abundant than usual and nearly all the common pests have been as destructive as ever.

### GARDEN INSECTS.

The White Fly (*Aleyrodes vaporariorum*, probably) also called the Mealy-winged Fly, has been very abundant this year. My attention was first drawn to it by its occurrence in large numbers on greenhouse plants, such as fuchsias, roses, etc. In the early part of July, in order to make alterations in the greenhouses, all the plants were brought out-of-doors and remained there during the rest of the summer. Owing to this, in all probability the White Flies were subsequently found on a large number of



plants in the vegetable garden, viz., beans, beets, carrots, cucumbers, parsnips, radish, rhubarb, salsify, squash, summer savory, tobacco, tomatoes; and on sunflowers and hollyhocks and a number of perennials in the flower garden. It, or probably another species, was also abundant on wild ginger. The waxen scale-like cases, under which the larvæ live, were to be found in

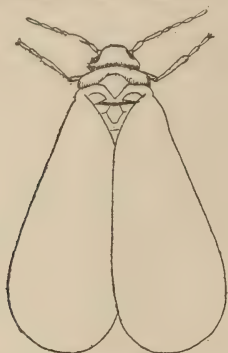


FIG. 3.—Mealy White Fly. Greatly enlarged. (After Gossard).

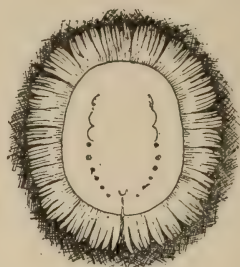


FIG. 4.—Scale-like covering of the larva. Greatly magnified. (After Gossard).

large numbers on the leaves and stems of the affected plants. In many instances considerable damage was done, not only by the loss of sap drawn off by these sucking insects, but also by the growth of fungus on the “honey-dew” that is secreted by the larvæ on the foliage beneath them. The only remedy for them appeared to be spraying with kerosene emulsion. Where a greenhouse is infested fumigation with hydrocyanic acid gas should be resorted to. The accompanying figures (figs. 3 and 4) represent the characteristic forms of the fly and the scale-like covering of the larva; both are very greatly enlarged.



FIG. 5.—The Tarnished Plant-Bug, much enlarged (after Lugger).

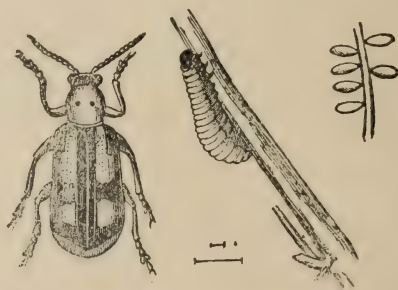


FIG. 6.—The Blue Asparagus Beetle; eggs and larva—magnified.

The Tarnished Plant-bug (*Lygus pratensis*) was another very abundant insect this year. It was first noticed in large numbers on the chrysanthemums that had been brought out of doors from the greenhouses; it attacked their terminal shoots and thus injured and in some cases destroyed the buds and future flowers. It was also to be found on asters and a number of other flowering plants in the borders, and on asparagus, beets, carrots, celery,

parsnips, potatoes, salsify, etc., in the vegetable garden. Early in the season it did some damage to strawberry and currant blossoms. This is a true bug and, like all the other members of the order, obtains its food by piercing the tissues of the plant it attacks and sucking out the juices. The adult insects (fig. 5) are about a quarter of an inch in length and vary in colour from yellowish-green to a dark brown. It may easily be recognized by the yellowish lines on the thorax and the yellow V-shaped mark just behind them on the scutellum. Choice plants may be protected by dusting with Pyrethrum insect powder mixed with three or four times its weight of flour and applied in early morning when the insects are sluggish and the foliage is moist with dew. On a larger scale kerosene emulsion or a decoction of tobacco may be used with advantage, if applied early in the morning before the bugs become too lively.

The two species of Asparagus Beetles, the Blue (*Crioceris asparagi*) and the 12-spotted (*C. 12-punctatus*) were very abundant all through the season, and were to be found on the plants as late as the end of September. Until last year the latter species alone was to be found, but now the Blue beetle (fig. 6) has caught up to it here on its spreading movement northward and westward. Both species have no doubt come to stay, and it is a pest that will have to be reckoned with by asparagus growers from now onward, just as we have the Colorado potato-beetle always with us. In spring when the shoots are being cut for table use, the beetles may be kept off by dusting with lime; later on, when the plants have grown large, the larvæ of the Blue species will be found feeding upon the foliage and may then be destroyed by dusting with a mixture of Paris Green and lime, or with flour instead of lime, which is often difficult to procure. These larvæ are somewhat slug-like in shape and are of a greenish colour. The larvæ of the other species, the 12-spotted, feed upon the seeds of the asparagus plant and live inside the round pods. They cannot, therefore, be treated with poisons, but may be got rid of by cutting down and burning all the seed-bearing plants as soon as the pods have attained their full size and are beginning to turn red.



FIG. 7.—The Blue Asparagus Beetle. Enlarged 8 times. (After Chittenden, U. S. Dept. Agric.)



FIG. 8.—The 12-Spotted Asparagus Beetle. Enlarged 8 times. After Chittenden, U.S. Dept. Agric.)

Both beetles are often to be found on the same plant and may easily be recognized, one (fig. 8) being of a reddish-orange colour with 12 round black spots on the wing covers; the other (fig. 7) is of a shining blue-black colour with white blotches on the wing-covers. These vary a good deal in size and shape and sometimes form a cross of the ground colour on the back. They pass the winter in the adult state and are ready to attack the asparagus shoots



as soon as they appear above ground in the spring. Like many other hibernating insects, they take shelter under rubbish, and thus afford another argument for clearing up and burning all garden refuse in the autumn.

The Parsnip Borer (*Depressaria heracliana*, De Geer) is an old enemy, though not a very common one, of the second years' growth of parsnips, both cultivated and wild. This year it proved injurious to some plants in the College garden. The full-grown caterpillar is about three-quarters of an inch in length, of a dirty green colour above and yellowish on the sides and beneath, with a number of shining black warts on nearly all the segments. The young larvæ first attack the large umbels of flowers, covering them with a web, which is rendered very unsightly with masses of excrement. When the flowers have been all devoured, they burrow into the hollow stems, usually entering at the axils of the leaves and there feed upon the soft, white lining. If, however, there should be young parsnip plants near by, some of the larvæ are apt to attack them and eat up the tender foliage. By the middle of July they begin to turn into the chrysalis state and the small moths appear in August after a fortnight spent as pupæ. This year the first moths in captivity came out on August 15th, but we have sometimes had them as early as the 1st of the month. The moths are dull gray, varied with black scales and blotches, and have a flattened abdomen with projecting scales at the sides. They have a habit, like some others of the genus, of coming into houses and secreting themselves behind curtains and in garments, and are consequently mistaken for clothes moths. A full description of the insect in all its stages is given in the *Canadian Entomologist*, vol II., pp. 1-4, 1870. The only remedy for the attack seems to be the cutting off and burning all the infested flowers and stems.

Among the familiar insects against which the gardener has to contend every year, may be mentioned the Zebra Caterpillar (*Mamestra picta*), which was found devouring the foliage of beets, in addition to its usual attacks upon cabbage, turnips and other plants.

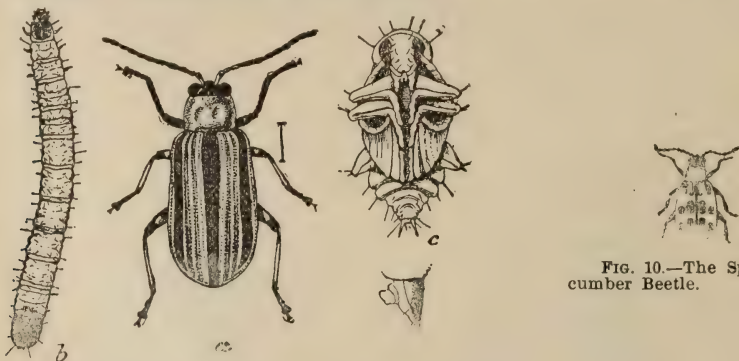


FIG. 9.—The Striped Cucumber Beetle: *a* beetle, *b* larva, *c* pupa. Enlarged 8 times. (After Chittenden, U. S. Dept. Agric.)

FIG. 10.—The Spotted Cucumber Beetle.

The Striped Cucumber-beetle (*Diabrotica vittata*)—fig. 9—and the spotted species (*D. 12-punctata*)—fig. 10—were both abundant during the later part of the summer in the blossoms of pumpkins and squashes; this was the second brood, the adults of which pass the winter as beetles, and are ready to attack young plants of the cucurbitaceous family as soon as they appear above ground in the spring. The second brood, though numerous, does no appreciable damage in the summer and autumn, as the plants are then so large and vigorous that the attack is unnoticed.

The root and stalk borers (*Gortyna nitela*—fig. 11—and *cataphracta*) were much complained of this year. The former was found in potato stems, and the latter was reported by Mr. C. W. Nash, of Toronto, as attacking all kinds of perennial plants in gardens, and also corn and tomatoes. It is difficult to prescribe any remedy for these insects, as they work out of sight and their presence is not suspected till they have seriously injured the plant.

Attacks by various species of Plant-lice (*Aphis*) were complained of in different parts of the Province; on Brussels-sprouts, for instance, at Stratford; on turnips at Grenfel; on hops at Shelburne; on sweet-peas at Penetanguishene; on honeysuckle at Toronto, etc. The ordinary remedies of spraying with kerosene emulsion or whale-oil soap wash have usually proved effective.

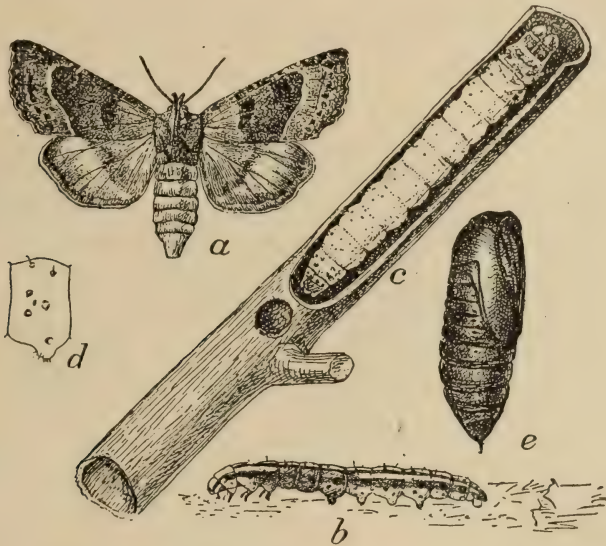


FIG. 11.—The Root and Stalk Borer (*Gortyna nitela*). *a*, female moth; *b*, half-grown larva; *c*, mature larva in injured stalk; *d*, lateral view of abdominal segment of same; *e*, pupa—all somewhat enlarged. (After Chittenden, U.S. Dept. Agriculture).

The Turnip Maggot (*Phorbia brassicae*) was seriously injurious at Markdale, and the Onion Maggot (*Phorbia ceparum*) at Woodstock. For these underground insects there has not yet been found any perfectly effective remedy. In the case of the species attacking onions, it is recommended to dust the rows of plants with white hellebore once a week from the time that the young plants appear above ground; later on, when the bulbs are forming, the earth may be removed down to the roots and the exposed part dusted with white hellebore. The attack on turnips is not usually very severe, but the same species is liable to injure cabbages and radishes. It may be dealt with by spraying with a carbolic wash made of one quart of soft soap (or one pound of hard soap) in a gallon of water with half a pint of crude carbolic acid; this mixture should be boiled for a few minutes and when required for use, diluted with fifty parts of water to each one of the mixture. The application should be made once a week to the growing plants until the danger of attack is over.

Cut-worms and Wire-worms have given trouble in many places; at Mount Charles the Colorado Potato-beetle attacked and did considerable



damage to tomato plants. Cabbage-worms (*Pieris rapæ*) were very abundant this year, and were especially injurious to cabbages and Brussels sprouts, as well as to mignonette and nasturtiums in the flower garden.

White-grubs, the larvæ of May-beetles or "June-bugs" (*Lachnosterna*)—fig. 12—caused much damage to the roots of strawberry plants at Wallace, and were grievously complained of in consequence of their injury to lawns and golf-links at London, Woodstock, Paris, Watford, Durham, Coldstream and elsewhere. In the case of lawns and boulevards in cities and towns, where the affected area is not very large, spraying liberally with kerosene emulsion and washing it in with plenty of water, has been found somewhat effective. When the roots of the grass are so devoured that the turf will roll up like a carpet, which was the case in some places, it seems as if the only plan would be to remove a few inches of the soil, beneath the sod containing the grubs, and then to replace with fresh earth and resod. In an enclosed garden poultry may be turned in to devour the grubs; robins and other birds render useful assistance also. Where the attack is on golf links, it would be found serviceable to enclose the infested spots with hurdles

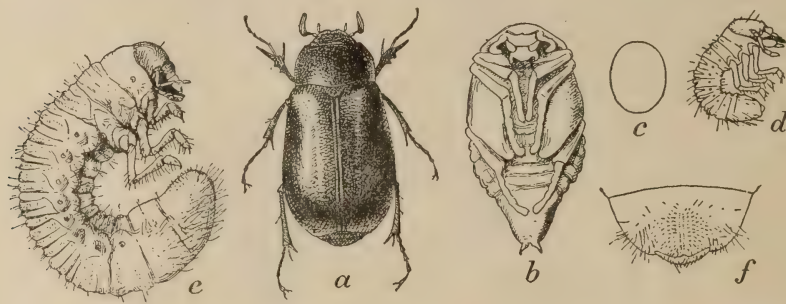


FIG. 12.—May Beetle: *a*, beetle; *b*, pupa; *c*, larva (White Grub)—slightly enlarged. (Chittenden, Bull. 19, n.s. Div. of Ent., U.S. Dept. of Agr.

and turn in a few pigs; these would soon root up and devour the grubs and could then be removed to another place. The parts of the field thus treated might then be levelled and resodded or sown with grass-seed. In ordinary cases the grubs thrive in old pastures, where they live underground for two or three years. A proper rotation of crops and the breaking up of all such fields is by far the most effective method of dealing with the insect. When the beetles are flying in May and June and doing much injury to the buds and foliage of trees and shrubs, spraying with Paris Green will kill large numbers; they can also be attracted by lights and destroyed. Boys also might be employed to gather them in early evening, and to search for them in their hiding places beneath the soil, along fences and against buildings.



FIG. 13.—Red-legged Locust.

While referring to pasture lands it may be mentioned that the Red-legged Locust (*Caloptenus femur-rubrum*)—fig. 13—was more than usually abundant this year throughout western Ontario and consumed a considerable amount of grass and cereals.

## FRUIT-TREE INSECTS.

The Oyster-shell Scale, or Bark-louse as it is usually called, (*Lepidosaphes ulmi*) is now wide-spread on apple-trees all over Ontario and has become through neglect a serious injury. Twigs completely encrusted with the scales have been sent in from many places, our correspondents fearing that they had to deal with the dreaded San José scale. On the College trees the lime-sulphur wash has been found thoroughly effective. When properly made and carefully applied in early spring, before the buds begin to swell, it completely removed the scales and left the trees clean; at the same time it destroyed other insects which attack the buds. In previous reports full descriptions have been given of the methods of making the wash and the proportions of the ingredients, it is unnecessary therefore to repeat them here.

The Rose-chafer (fig. 14), or Rose-beetle (*Macrodactylus subspinosus*) has been remarkably abundant this year. Specimens have been sent or brought to me from Toronto on the east, to the County of Essex on the west, but none from localities east of Toronto. In the Niagara District and here

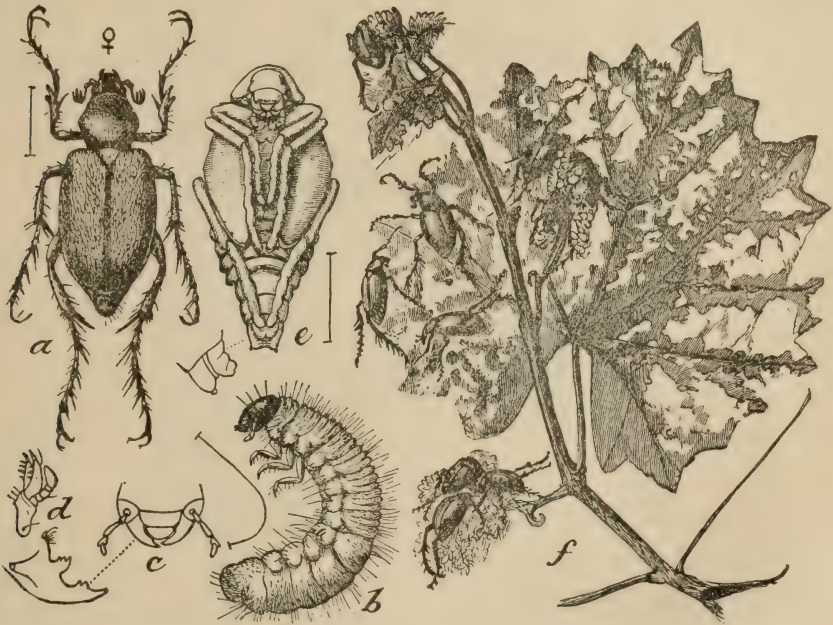


FIG. 14.—Rose Chafer (*Macrodactylus subspinosus*). a, beetle; b, larva; c and d, mouth-parts of same; e, pupa; injury to leaves and blossoms with beetles, natural size, at work. (After Marlatt, U.S. Dept. Agriculture.)

and there in the counties bordering on Lake Erie, the insect was especially abundant. In the neighborhood of London it has been prevalent for some years, but does not seem to extend much to the northward of the region referred to. There are, however, isolated occurrences in other parts of the Province recorded, as an example of which may be mentioned a severe attack upon young corn in the County of Grey last year.

The following is an account of the insect furnished by the writer to the *Toronto Globe* in July last, which may be repeated here:—

This destructive insect is called the Rose-beetle, from its attacks upon the buds and full-blown flowers of roses, which it burrows into and devours, but it by no means confines its attention to this plant. It is especially in-



jurious to the blossoms of the grape, upon which it clusters in great numbers and soon destroys all possibility of fruit, and it attacks the blossoms of fruit trees, large and small, ornamental shrubs, flowers, and in fact almost any kind of vegetable growth. It appears in immense numbers, and covers the plants that are attacked with a sprawling mass of beetles, full of alarm to the careful gardener and anxious grower.

The beetle is pale brown or drab in color, about a quarter of an inch in length, and with very long, spiny legs. The early stages of the insect are passed underground in sandy meadow land, where as a grub it feeds upon the roots of grasses and other plants. The eggs are laid by the female beetles in the ground during June and July, and the grubs become full-grown before winter; in the spring they turn into the pupa (or chrysalis) state, and come out as winged beetles in June. For about five weeks in June and July they abound, and then suddenly disappear, having completed their life course, not to be seen again till the following summer. Happily there is only one brood in the year.

It is a remarkable fact that the ordinary insecticides have little or no effect upon this pest, and it will eat blossoms sprayed with Paris green and thrive upon them. Many experiments have been tried, and it is found that, where the work is to be done on a large scale the congregated insects may be repelled by a wash made by adding about three pecks of freshly-slaked lime to a quart of crude carbolic acid in fifty gallons of water. This does not kill the insects, but the smell of the carbolic drives them away.

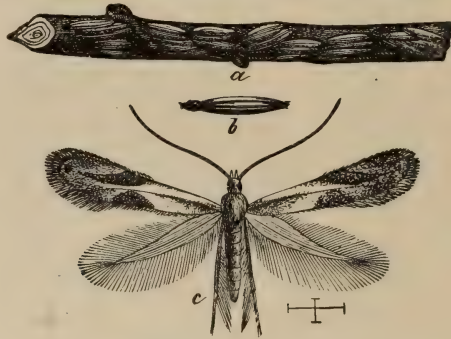


FIG. 15.—The Apple *Bucculatrix*. a, cocoons on twig; b, single cocoon; c, moth, greatly enlarged.

Another method is to spray the masses of beetles with half a pound of fish-oil soap in a gallon of water. It is claimed that this will kill about 95 per cent. of the insects. It acts by closing up their breathing apparatus and causing death by suffocation. On a small scale much may be done by beating the insects, in the early morning when they are sluggish, into pans containing a little coal oil and then burning them; or they may be knocked off into an open umbrella and then destroyed. Choice grapes or plants may be protected with netting.

It is now, however, almost too late to do much this season, as the destructive period of their lives is nearly over, but measures should be taken to prevent the recurrence of the pest next year. This can be done to a large extent by breaking up all the sandy meadows or old pastures in the neighborhood where the insects occur and putting in some crop instead. They do not breed in clay land, but in sandy soil, especially where it is damp from want of drainage. In this case, as in many others, the destructive insect has not much chance of appearing in injurious numbers if clean, scientific farming is carried out with a proper rotation of crops.

The large caterpillars of the Cecropia Emperor Moth were remarkably abundant this year on apple and crab trees at London, Brantford and Guelph. Being so large and voracious they consume the foliage very rapidly and soon strip a branch of its leaves. In Toronto Mr. Nash found it in considerable numbers on spiræa, as many as a dozen being seen on one bush in August. This handsome insect cannot be classed amongst our noxious species, as it rarely occurs in any numbers, being kept in check by its parasitic enemies; the cocoons in winter are also attacked by woodpeckers, who perforate the silken wrappings and suck out the liquid contents of the chrysalis.

Among other insects affecting the apple may be mentioned the Common Eye-spotted Bud-moth (*Tmetocera ocellana*) which we always have with us. The Apple Bucculatrix (*B. pomifoliella*)—fig. 15—mining the leaves, was

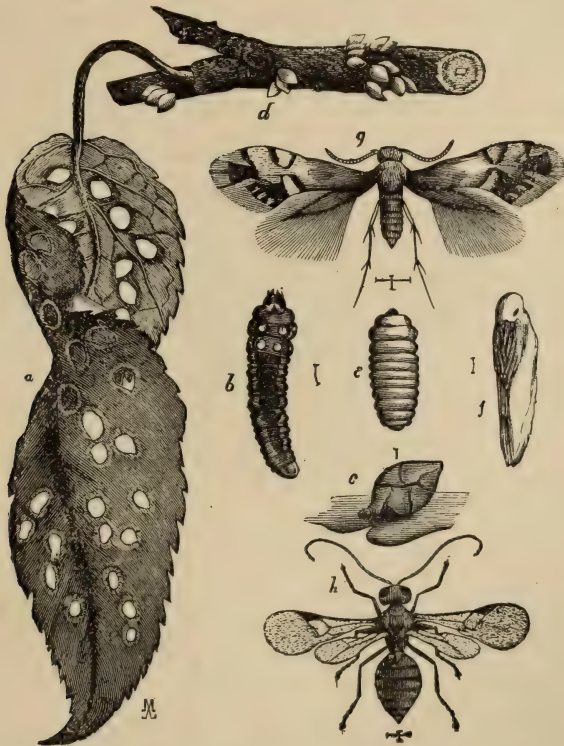


FIG. 16.—The Resplendent Shield-bearer. a, leaf showing holes made by insect; b, caterpillar; c, case; d, cases on twig; e, chrysalis; f, chrysalis; g, moth; h, parasitic fly.

abundant on some trees; its narrow, white cocoons were found in numbers on the twigs where the tiny caterpillars had attacked the foliage; at St. Catharines it occurred in injurious numbers.

An unusual attack upon the foliage of Quince trees was reported by Mr. Alister McKay, of Chatham. Large numbers of the leaves were found to be riddled with roundish holes in September, and in October the singular flat oval cases containing the chrysalids were to be seen in numbers attached to the leaves and to boards standing on end near the trees. The parent insect is a very beautiful minute moth called the Resplendent Shield-bearer (*Aspidisca splendoriferella*) which comes from the cocoons in May. The accompanying illustration (fig. 16) shows the insect in its various stages;



the moth is richly decorated with gold and silver streaks on its wings. The lime-sulphur treatment would no doubt clear the trees of these small cocoons and put an end to the attack.

#### SHADE-TREE INSECTS.

The Tussock Moth, which has been so often referred to and described in our Annual Reports, has continued its depredations on the shade trees of Toronto and some other places. It seems extraordinary that effective methods of control have not been adopted by those who have charge of the city parks and avenues. The remedy is simple, easy and effective and should not be very costly. It is only necessary to have the white egg-masses removed from the trees during the winter and destroyed by burning; this will get rid of the following season's crop of caterpillars. Trees once cleared, unless their boughs interlace with others that have not been attended to, will not be affected again for many years, as the female moths are wingless and they cannot travel any distance. Any cocoons that do not bear an egg-mass should not be interfered with as, if not empty, they contain either useful parasites or the chrysalids of the harmless males.

The Cottony Maple-scale (*Pulvinaria innumerabilis*) which has been excessively abundant on the shade trees in the streets of London for several years, and has also spread to vines and creepers, has at length begun to wane. During the past summer there was a very evident diminution in its numbers, so much so that it was hardly noticeable in some parts of the city and has ceased to excite alarm.

It is reasonable to expect, from past experience, that the insect will not be troublesome for some years to come, owing no doubt to the check it has received from useful parasites and unfavorable atmospheric conditions. At Guelph twigs were found this summer covered with the scales, but on examination it proved that not even one per cent. of them were alive; the rest were all dead and in many cases there was a hole in the scale through which the parasite had emerged. A similar condition was found in specimens sent from St. Mary's and Fergus.

The Black-banded Scale (*Eulecanium nigrofasciatum*, Perg.), called also the Terrapin Scale from its turtle-like shape, was found in great abundance on a maple tree near St. Catharines. Though not a common insect in Canada, it might easily become an injurious pest as it also attacks plum, peach, apple, linden, birch and several other trees. The affected tree was to be cut down and burnt in order to prevent any danger of the spread of the insect to the neighboring fruit orchards.

Another attack upon Maples of an interesting character was reported by Mr. Donald Fisher, of Vittoria, in September. The insect was the Maple-leaf Cutter (*Incurvaria acerifoliella*) which, in the caterpillar stage, cuts out round pieces of the leaves and forms with them a case in which it lives and hides. When in the case it feeds upon the leaf all round its dwelling and thus marks it with a series of blotches forming a circle on the surface of the leaf; when it has completed the circle in one place it moves to another on the same leaf and repeats the operation, till the leaf is covered more or less thickly with these round and conspicuous blotches. When the caterpillars are fully grown, the cases fall to the ground and the chrysalis stage is entered upon. There they remain all winter beneath the trees, and in the following May the tiny moths appear, pretty creatures with long, narrow pointed wings, the front pair steel-blue and the hinder ones smoky brown with a purplish reflection; on top of the head there is a tuft of bright orange hairs. These insects are sometimes numerous enough to completely defoliate

the maple trees they attack; but they are rarely to be found in numbers two years running, and as they work late in summer they do not injure the trees very much, the leaves having by that time nearly completed the discharge of their functions. If found to be necessary, a simple remedy would be to rake up the leaves, including the cases, under the trees and burn them on the spot. Dr. Fletcher, in his Report for 1885, records an attack by this insect on maple trees in the neighborhood of Ottawa, and also relates a similar visitation in Missisquoi County, P. Que., described by the Rev. Dr. Fyles in the year 1881.

The Spruce Gall-louse (*Chermes abietis*) Fig. 17, has become a serious enemy to spruce trees and is causing much trouble and anxiety to the growers of these ornamental trees in many parts of the Province. It is very abundant at Guelph, Galt, Minden, Chatham and various other places. As it has frequently been described and referred to in these Annual Reports, it



FIG. 17.—Spruce Gall-louse. a, summer form of nymph; b, affected twig.

may suffice to mention now that good results have been obtained by spraying affected trees at the time the young plant-lice are exposed with a tobacco and soap wash or with kerosene emulsion. This should be done in May when the young lice emerge from the eggs and before they are enclosed in the galls, and also towards the end of August when the winged forms come out of the galls. The terminal shoots should be watched at those times and the spraying performed as soon as any of the insects are to be seen moving about. They are so minute that a magnifying glass will be required to see them. The spraying should be repeated two or three times at short intervals, as the insects do not all come out at the same time.

The Larch Saw-fly (*Nematus Erichsonii*) is still to be found here in a small plantation on the College premises. Towards the end of July full-grown larvae were found, which assumed the chrysalis stage a few days after they were collected (July 23). There had evidently been a serious attack in the spring, as nearly all the boughs had a very short and scanty clothing of light green foliage, contrasting strongly with the deeper hued and much longer needles on the branches that had not been defoliated. The ground



beneath the trees was covered with the old droppings from the caterpillars. This plantation has been repeatedly sprayed in previous years, but the insect is very far from being exterminated. Its ravages in the Province of Quebec are graphically described by Dr. Fyles in another part of this Report.

Spittle insects (*Aphrophora*) were abundant this summer on some Scotch Firs and also upon grass in pasture fields—no doubt different species. The masses of white froth, resembling spittle, were very conspicuous, each one containing the strange larva which produces it. The adult bugs were to be found in numbers on the Fir trees later in the summer. No serious damage was done in either case, though no doubt an extensive attack must reduce the vitality of a tree, and in a pasture the presence of the frothy masses would be very distasteful to the feeding cattle.

The Fall Web-worm was very abundant again this year. It is so conspicuous and so easily got rid of, a whole colony at a time, that there is surely no excuse for its increase and prevalence. The very unsightliness of the webs, with their foul masses of excrement and cast-off caterpillar skins, ought to be enough to cause every one with a spark of tidiness in his composition to clear at least his own trees and induce his neighbors to follow his example.

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### INSECT GALLS OF ONTARIO.\*

By TENNYSON D. JARVIS, ONTARIO AGRICULTURAL COLLEGE, GUELPH

I am under obligations to numerous friends and correspondents who have aided me in this work. I am especially indebted to Mr. W. R. Thompson, O. A. College, for the assistance he has rendered in the preparation of this work. I am under obligations to the Department of Entomology, Washington, D.C., Dr. Bethune, Dr. Fletcher, Prof. Lochhead, Mr. J. Eaton Howitt, Mr. C. W. Nash and Mr. Douglas Weir for the assistance they have given me.

Among the many curious phases of insect life, and among the many wonderful illustrations of the effects of evolution upon organized structures with which we meet in the study of entomology, there are few examples which present such varied and interesting peculiarities of structure and development as do insect galls. Varying as they do from such simple malformations as the curled leaves produced by the work of aphids to such beautiful and complex structures as the oak-apples and oak twig-galls, they present a succession of types which show in a peculiar and wonderful manner the changes in structure of insect and plant induced in the struggle for existence. A gall may be briefly defined as a malformation of plant tissue induced by mechanical or chemical stimulus or by some other unknown cause. These are sometimes produced by fungus, but those with which we have to deal are produced in different ways by the work of insects. The habit of gall-making seems to have arisen at different times and in entirely different orders and families of insects, and even a branch of the order Acarina has acquired this gall-making habit. In each case, however, it has developed along lines which depend directly upon the structure of the insect, so that in many cases the classification of the insect can be considerably simplified by an examination of the gall. For instance, the Cecidomyiid, having an ovipositor incapable of piercing, lays its eggs upon the surface of the leaf,

\*See plates at beginning of volume.

and the gall thus induced by the work of the larva is generally open; while the Cynipid, having a stinging ovipositor, deposits its eggs in the leaf tissue through a minute puncture, which, quickly healing, leaves the gall closed and the insect at maturity emerges through a hole which it cuts in the gall, which the Cecidomyiid, on account of its sucking mouth parts, is utterly unable to do. Here, moreover, we have an explanation of the apparently contradictory fact that Cecidomyiid galls are sometimes closed, because whenever we find this condition we invariably find the gall splitting open at maturity. The reason for this in all probability is that the larva entering the tissues makes a much larger incision than the minute puncture induced by a Cynipid's ovipositor, and this, never completely healing, splits open when the tissues commence to dry up in autumn. Similarly in other orders the structure of the gall-maker determines the form of the gall.

These abnormal growths have long been noticed and commented upon. The earliest authentic work upon the subject was by Malpighi. In 1686 he published his "De Gallis," containing descriptions of a number of galls common to Italy and Sicily. In America the subject was first taken up by Osten Sacken, Walsh, Basset, Riley, Harris, and a few others who have laid the foundations for most of our work on galls. Now a large number of writers, among whom may be mentioned Ashmead in Hymenoptera, Pergande in Hemiptera, Garman in Phytoptidae and Norton in Nematinae. A host of European writers have also taken up the subject, but in this country there still remains an enormous amount of work to be done even in classification, while the morphology and histology is practically an unexplored territory.

The insects producing galls are confined principally to four orders, the Acarina, which are not true insects but mites, the Diptera or flies, the Hemiptera or bugs, and the Hymenoptera including two families, the Tenthredinidae and Cynipidae, and to a slight extent the Chalcididae. It is a curious fact that the insects which are of the most developed and specialized structure, produce the most complex galls. That is, in the lower orders, as Thysanura, the orders formerly included in Neuroptera, Orthoptera, and other orders, we find no gall-making habits; while in the Diptera, Hemiptera and Hymenoptera, and to a slight extent in the Lepidoptera and Coleoptera we find the habit developed. This curious coincidence may be possibly explained thus—if, indeed, the lower and less specialized forms which came into existence in an earlier age when a lower and now extinct type of vegetation flourished, ever produced forms with the habit of gall-making, these forms probably perished with the flora of that age, while the later forms which now produce galls were evolved at a much later period when the flora resembled that of the present age.

The orders of insects among which we find the greatest number of gall-producing insects are the Hemiptera, Diptera and Hymenoptera, and to some extent the Coleoptera and the Lepidoptera. The order Acarina in the class Arachnida contains the family Eriophyidae or gall-mites. These are also specialized forms, inasmuch as acaralogists seem to be unable to agree upon their relationship to other Acarina.

#### *Acarina.*

##### Family Eriophyidae, Gall-Mites.

This is a family of microscopic mites which are quite curious and unusual in structure. They have only two pairs of legs and the abdomen is long and striated. These striations, which differ in the different species, and differ in number on the dorsal and ventral surfaces, are of considerable



value in classification. The galls produced vary in form, but are always open or provided with an opening through which the mites pass in and out. They are generally lined with minute hairs or granules, and are quite simple in structure. Reproduction takes place within the gall.

### *Coleoptera.*

Family, Buprestidae. Metallic Wood Borers.

This is a family of the beetles containing insects whose larva bore in wood of trees and shrubs. A few produce galls, the most important one being the Red-necked *Agrilus* producing galls upon the Raspberry and Blackberry canes.

### *Lepidoptera.*

Super-family, Tineidae. Leaf miners and clothes moths.

This family is very large and the larvae are mostly plant feeders. The adults are minute moths with narrow wings bordered with wide fringes. The family contains but few gall-makers.

### *Hemiptera.*

Family, Aphididae. Aphids or plant lice.

These are small, soft bodied insects which suck up the juices of plants and which often produce galls. There are winged and wingless forms, the wingless forms reproducing parthenogenetically. The galls produced vary in form from mere leaf curls to forms of most curious appearance but of quite simple structure. They are all open or furnished with an opening, and large numbers of the aphids can be found if the gall is opened.

Family Psyllidae. Jumping plant lice.

The members of this family resemble the preceding to a great extent, but they are not so numerous. The hind legs are formed for jumping.

### *Diptera.*

Family, Cecidomyiidae. Gall gnats.

These insects in the adult stage are rarely seen. They are very delicate, small, two-winged flies and with few veins in the wings and with sucking mouth parts. The eggs are laid upon the leaf surface and the larva either feeds there, making an open gall, or makes an incision in the leaf and enters, forming a closed gall, which splits open at maturity at the point where the larva entered. The larvæ can generally be readily identified by their color, which is orange, red or pink, and by the development between the second and third segments of the body of a peculiar horny projection called the breast-plate, the use of which is not definitely known.

Sub-family, Trypetinae.

These flies are much larger than the preceding, but few of them produce galls. Two species, *Trypeta polita* and *Trypeta solidaginis*, produce galls upon the goldenrod. The adults are pretty flies with banded wings.

### *Hymenoptera.*

Family, Tenthredinidae.

In this family the Nematinae produce galls. The head and thorax are wide. The base of the abdomen is broadly joined to the thorax, and the abdomen of the females is furnished with a pair of saws. The larvae have from twelve to sixteen prolegs. These insects have been very thoroughly taken up by Norton in his monograph on Nematinae. A large number make galls on Willows.

### Family, Cynipidae. Gall flies.

This is a family of very minute, four-winged insects. In the adult gall fly the abdomen is unusually compressed and joined to the thorax by a short peduncle, the first abdominal segment. The first segment is large and the remaining ones are short and each is more or less covered by the preceding. The ovipositor is long and slender. The insect deposits its eggs within the tissues of the plant by piercing it with its ovipositor. The wings have few veins and the fore-wings lack the stigma. The galls produced are closed and the insect emerges at maturity through a hole which it cuts in the gall. One of the most interesting features of insect life that has been discovered was noticed by Bassett and confirmed by Adler in regard to these insects. By careful investigation he discovered that two generations of these insects were produced every year, each of which produced a different sort of gall, and which could not be recognized as the same species. There is still, however, an enormous amount of work to be done upon this subject in America.

#### ERIOPHYIDAE.

*Eriophyes quadripes*. Produces top-shaped galls on the upper surface of the leaves of soft Maple. The galls are greenish at first, then become red, or purplish and finally dark brown. In the younger galls the inside wall is fairly smooth and the interior is hollow. As the galls grow older, irregular and somewhat granular excrescences appear on the interior wall and grow toward the centre until in the older specimens the interior may become quite full. It occurs on Soft Maple (*Acer dasycarpum*). Very common.

*Eriophyes acericola*. The mature galls are green and resemble in form and position the summer cases of the cigar-case-bearer. The interior wall is granular and parallel excrescences are found, but even at maturity they do not extend to the centre of the interior as in the case of *E. quadripes*. Occurs on Hard Maple (*Acer saccharum*). Very common.

*Eriophyes abnormis*. Produces balloon-shaped galls on the upper surface of the leaf. The apex of the gall is usually serrated. The interior has ridges projecting inward and the folds in the old galls nearly fill the cavity. Occurs on Basswood (*Tilia Americana*). Very common.

*Eriophyes ulmi*. The galls are intermediate in form between those of the Hard and Soft Maples and somewhat balloon-shaped. The interior wall is ridged vertically. The galls usually occur on the upper side of the leaves. Occurs on Soft Elm (*Ulmus Americana*) and Rock Elm (*Ulmus Racemosa*). Very common.

*Eriophyes sp.* Produces irregular wart-like swellings on the upper surface of the leaves of the Manitoba Maple. The swellings are green at first but turn gray when mature. The average diameter of the gall is about 3 m.m. The under surface of the galls appears as irregular concavities lined with a granular secretion, which is greenish at first and rusty brown when old. Occurs on Manitoba Maple (*Acer negundo*). Common.

*Eriophyes phloeoptes*. Produce tubercular gall masses which encircle the base of the buds and shoots of the cultivated plum. The galls are about one-sixteenth of an inch in diameter, and the interior is granular with a small cavity in the centre. As many as sixty-two of these mites were found in a single gall. Occurs on cultivated Plum (*Prunus domestica*). Not common.

*Eriophyes sp.* This species produces an abnormal growth of the buds of the Yellow Birch. The terminal growth of the twig is checked and large bunches of buds are formed sometimes as large as a hen's egg. The galls remain on the tree, giving the tree an unsightly appearance in winter. Occurs on Yellow Birch (*Betula lutea*). Common.



*Eriophyes pyri*. Produces blister-like swellings on the leaves of the Pear and Apple. The blisters are reddish brown in May, green in June, and dark brown or black in the latter part of June. The blisters usually run together, forming irregular blotches over the upper surface of the leaf. Occurs on Pear (*Pyrus communis*) and Apple (*Pyrus malus*). Very common.

*Eriophyes sp.* This gall is green and red and about 2 c.m. in length. It consists of a fold of the leaf making a long, irregular, wavy projection on the upper surface of the leaf. From beneath this appears as a serpentine incision in the leaf. It is about 2 m.m. high. It is hard and roughened on top. From the midrib to the edge of the leaf is the general direction of the gall. Occurs on Hawthorn (*Crataegus sp.*). Common.

*Eriophyes sp.* Produces galls about 2.5 m.m. in length by 1.5 m.m. broad. It is joined to the leaf by a constriction. Externally it is red and pubescent. Inside gall is full of granular material and contains numerous mites. Occurs on Speckled Alder (*Alnus incana*). Common, especially upon the leaves of the bushes at the water's edge.

*Eriophyes sp.* This mite produces galls of the typical Eriophyid shape upon the leaves of the Paper Birch. The galls are yellowish or reddish, joined to the leaf by a constricted neck and rather smaller than usual, being about 2 m.m. long by 1 m.m. broad. They appear on both upper and under sides of the leaf, and when found upon the under side, hairy. The opening on the opposite side through the leaf lined with white hairs.

Parasitic mites attack this species and often they are found to have devoured or driven out all of the gall makers. Occurs on the Paper Birch (*Betula papyrifera*). Common.

*Eriophyes salicola* Garman. The gall is irregular, roundish and serrated, with a roughened top, projects about 1.5 m.m. from the surface of the leaf, slightly constricted where it joins the leaf. From 1-4 m.m. in diameter. On the under side there is sometimes a small projection and sometimes a cup-like cavity in which are seen the roughened portions of the under side of the gall. When the gall is mature, it is filled with granular excrescences and hairs growing from the interior walls. The gall is green or red and distributed over the upper or lower surface of the leaf. Occurs on *Salix Alba*, *Salix balsamifera*, *Salix discolor*, *Salix rostrata*.

The description was taken from Galls on *Salix balsamifera*.

*Eriophyes sp.* This mite produces dimples on the leaves of the Aspen on the upper side lined with spherical granules, reddish or greenish in color. These consist of soft parenchymatous tissue upon which the mites feed. The galls are fairly uniform in size, being about 2 to 3 m.m. in diameter. The galls are green in color and occur three or four to a leaf. Occurs on Aspen (*Populus tremuloides*). Common.

*Eriophyes sp.* The galls consist of irregular projections on the upper or under side of the leaf and are quite generally distributed in patches, 4-5 m.m. in length or even 1.5 c.m. They project about 1-1.5 m.m. above the leaf. On the under side they appear as irregular cavities lined with white vegetable hairs. The galls are green in spring, turning red later in the season. Occurs on Poison Ivy (*Rhus toxicodendron*). Common.

*Eriophyes sp.* This gall consists of a small circular depression averaging about 2 m.m. in diameter and always depressed on the lower side of the leaf. On the upper side it appears as a green or red circular elevation. The gall is lined with minute spherical granules composed of soft parenchymatous tissue. Occurs on large-toothed Aspen (*Populus grandidentata*). Common.

*Eriophyes* sp. This gall is so different in structure from the typical *Eriophyes fraxini* gall that I have no hesitation in placing it as a different species. The galls are produced almost invariably along the principal veins. Dorsally they are light pinkish white in color, about 2.5 by .75 m.m. and growing on either side of the vein. The surface of the gall is transversely seamed and irregular. It lies in a one-sided position upon the leaf. Ventrally the galls appear as white, hairy projections following the veins. The opening runs the full length of the gall and is lined with white, hairy tissue. The mites are exceedingly numerous, more occurring to a gall than of any other species. They can easily be detected with a hand lens and are brown in color. The interior of the gall is lined with soft tissue. Occurs on White Ash (*Fraxinus Americana*). Not common.

*Eriophyes* sp. This gall is a pouch-like growth on the upper side of the leaf. It is distinguished from *E. serotinae* by the fact that it has not the funnel-like opening of that gall. It is green or reddish, about .5-.7 cm. in length and 3 m.m. in diameter at its widest part. Near the leaf it is constricted to about 2 m.m. in diameter. The interior of the gall is lined with small granules and among these the gall mites feed. The gall opens on the under side by a minute aperture about 1 m.m. in diameter lined with fine white hairs. Occurs on Chokecherry (*Prunus virginiana*). Common.

*Eriophyes* sp. Only one specimen of this gall was found. It is of the same type as the gall on Chokecherry, but rather longer and narrower. It is green in color and the inside is lined with rough juicy tissue. Only two mites were found in the gall, near the opening. Occurs on Wild Plum (*Prunus Americana*). Not common.

*Eriophyes querci*. This is an irregular dimple upon the blade of the leaf. It is of the same color as the leaf when young, but turns yellowish red with age. From beneath it appears as an irregular concavity, lined with a tangled mass of white vegetable hairs. Among these abnormal hairs are the mites, which feed upon the tissue and produce the gall. The gall is 3 to 5 m.m. in diameter. Occurs on Bur Oak (*Quercus macrocarpa*). Common.

*Eriophyes serotinae*. This gall is pouch-like. It occurs upon the upper side of the leaf with a deep funnel-like opening beneath. The gall is about .5-.6 cm. in length and consists of a pouch-like hollow growth on the upper side of the leaf constricted about half way to the leaf. The interior of the gall, which is green or red and green, is covered with minute granulations, which seem to be the food of the mites producing the gall. The distinguishing character of the gall is the deep funnel-like opening beneath lined with hair through which the mites pass in and out. Occurs on Black Cherry (*Prunus serotinae*). Common.

*Eriophyes* sp. The gall made by this species of *Eriophyes* consists of a small round swelling which protrudes very slightly on both sides of the leaf. This is about .5-1 m.m. in diameter, green in color in spring, and turning brown in summer and autumn. The galls are very numerous where they occur, and as many as 100 are sometimes found on a single leaf. The gall contains numerous mites, which feed in the irregular cavities in the gall. Occurs on the spotted Hawthorn (*Crataegus punctata*). Not common.

*Eriophyes* sp. Red patches are found upon the upper sides of the leaves of Maples, resembling hoar-frost. Under the microscope, it is seen to consist of minute pink balls, joined to the leaf by a constricted neck and occurring in such numbers as to appear like red frost. Occurs on Hard Maple (*Acer saccharum*). Common.



*Eriophyes* sp. It differs from the frost mites on Hard Maple and Beech in that it does not consist of a mass of spherical granules, but of a mass of tangled threads which under the lens are seen to be arranged in very beautiful star-like clusters. The mites are easily found among these. The patches are found on the under side of the leaves between the ribs. Occurs on Rock Elm (*Ulmus racemosa*). Common.

*Eriophyes* sp. The structure of this frost mite gall is much the same as that of the red frost mite, but the mass of excrescences is thicker, white in color and produced upon the under side of the leaf. Occurs on Hard Maple (*Acer saccharum*). Common.

*Eriophyes* sp. The gall consists of a mass of tangled white vegetable hairs. The growth is very much the same in general appearance as the one producing the "frost" and "down" on Rock Elm and Beech. The mites are quite small and difficult to locate, as they are much the same in color as their surroundings, and remain down in the lower part of the gall near the leaf. The gall is found on the lower side of the leaf, a common place is in the axils of the veins. Occurs on Mountain Maple (*Acer spicatum*). Common.

*Eriophyes* sp. The work of this mite is very commonly seen. It appears upon the leaves of Beech quite early in the season. The presence of the mite is shown by large irregular white masses on the under surface of the leaves which have a glittering appearance resembling hoar frost. Under a microscope, this appears as a mass of innumerable, minute, spherical granules. Among these are the mites, which are few and very difficult to locate. The upper surface of the leaves upon which the frost mite is working are discolored and in some cases distorted. Occurs on Beech (*Fagus sylvatica*). Very common.

*Eriophyes* sp. This consists of a mass of minute, yellowish, transparent, granular bodies upon the leaf, growing together in such numbers as to form large patches of frost running between the ribs, which hide the leaf. The patches vary from 1 cm.-3 cm. in length and from .25-1 cm. in diameter. Among these granules are the mites which are extremely minute, the smallest of all the mites yet examined. Occurs on Paper Birch (*Betula papyrifera*). Common.

*Eriophyes vitis*. These are typical Eriophyid galls about .5 cm. in length by 2.5 m.m. at the widest portion to 1 m.m. at the constricted portion near the leaf. The top of the gall is irregular, being much in appearance like *Eriophyes abnormis*. The interior and the entrance to the gall is lined with white vegetable hair. The galls are green in color and grow mostly upon the under sides of the leaves, with the opening upon the upper side. Occurs on Wild Grape (*Vitis cordifolia*). Not common.

*Eriophyes fraxini*. The galls produced by this species of mite are found upon several species of Ash, and vary somewhat in structure according to the leaf upon which they are found, upon Red Ash being hairy, upon White Ash glabrous, etc. They consist of somewhat irregular circular swellings from 2-4 m.m. in diameter which protrude upon both sides of the leaf. Sometimes they occur only 10 to a leaf, but sometimes as many as 75 are found, entirely covering the surface of the leaf and so interfering with its functions as to injure the tree upon which the galls occur. The surface of the galls is rough. Several often unite, to form a large irregular patch. On the under side are the minute, hairy-lined openings into the galls. The galls are hollow, thick-walled, and lined with numerous granular excrescences and irregular growths. The gall is of a lighter green than the rest of the leaf. Occurs upon White Ash (*Fraxinus americana*) and Red Ash (*Fraxinus pubescens*). Common.

*Eriophyes* sp. This is one of the "frosts" produced by the work of the mite upon the leaves. The patches of frost are pure white in color, and occur on the under side of the leaves, in the axils of the veins. Under the microscope, these patches of "frost" appear as dense masses of thick transparently white hairs. The patches vary in size from 4-10 m.m. On the leaves of *Alnus incana*. Not common.

*Eriophyes* sp. This consists of a dense mat of brown hairs growing in large patches upon the under sides of the leaves. Above, the leaf appears lighter in color and rather abnormally shiny where the gall mites are working beneath. On *Quercus coccinea*. Common.

*Eriophyes* sp. Circular, flat, or slightly convex patches varying from 2-3 m.m. in diameter on the upper side of the leaf, the under side being covered with minute granular excrescences, which vary from white to dark brown in color. On *Populus grandidentata*. Common.

*Eriophyes* sp. Irregular patches of frost, transparently white in color and appearing as a mass of minute granules. Under the microscope similar to the frost upon the Beech and Maple. Occurring upon the surface of the leaves. Occurring upon the leaves of the Low Birch (*Betula pumila*). Uncommon.

*Eriophyes* sp. Similar to the above but rosy pink in color, and occurring in much larger patches, upon the upper side of the leaves. On *Betula lenta*. Common.

*Eriophyes* sp. These galls are produced upon the Soft Elm, and when young bear some resemblance to the typical mite gall of the Elm (*Eriophyes ulmi*), but the distinguishing peculiarity of these galls is that they grow until they reach a size far exceeding that of any *E. ulmi* yet observed, sometimes attaining a length of 2 by 1.5 cm. The development of the galls also differs from that of *E. ulmi*, which commences as a button with a constricted neck, while this gall often commences as a cone, or deep dimple. On Red Elm (*Ulmus pubescens*). Not common.

#### HEMIPTERA.

##### *Spruce Gall-louse (Chermes abietis).*

These galls are greenish swellings, occurring on the twigs of various species of Spruce and sometimes in immense numbers. The galls are polythalamous, containing from three to thirty cavities within each of which live twenty or thirty minute yellowish insects. In July the galls dry up, and the cavities open, allowing the lice to escape. These molt and some of them assume wings. This gall-louse is one of the worst pests of Spruce trees known. In many parts of Ontario nearly every tree is abundantly covered with this gall, and the insects do great damage by sucking the juices of the tree. Occurs on White, Black and Norway Spruce—*Picea alba*, *Picea nigra* and *Picea excelsa*. Very common.

##### *Vagabond Gall (Pemphigus vagabundus).*

Produces large irregular galls on the tips of the twigs. It is a monothalamous gall consisting of a double lamina, and between these two layers are large numbers of aphids. The gall usually remains on the tree over winter. Occurs on the Cottonwood (*Populus deltoides*). Common.

##### *Cockscomb Gall on Elm (Colopha ulmicola Fitch).*

A hollow, cockscomb, thin-walled gall on the leaf of the American Elm. Occurs on the upper side of the leaf. The apex of the gall is serrated and the sides grooved. The gall appears inflated. The opening is on the under side of the leaf, running the full length of the gall. The in-



terior contains numerous aphids in July and June. The gall is 1.5-2 cm. long by 1 cm. high. Occasionally a number occur on a leaf side by side. It is constricted near the base. Occurs on American Elm (*Ulmus Americana*). Common.

*Spiny Witch-Hazel Gall (Hormaphis spinosus).*

This gall is round, covered with long spines. It is a deformation of the fruit bud. The spines are covered with little clusters of hair like those on a cactus leaf. In it are many small aphids, brown in color. The opening to the gall is at the base, near the stem of the gall by which it is joined to the branch. Green in summer, woody and hard in winter. Occurs on Witch-Hazel (*Hamamelis virginiana*). Common.

*Witch-Hazel Cone Gall (Hormaphis hamamelidis).*

This gall is cone-shaped, about 5 m.m. in length by 3 m.m. in diameter. It occurs on the upper side of the leaves, with the opening through a small hole in a slightly projecting cone on the under side of the leaf. The opening is about 5 m.m. in diameter. The gall is hollow, containing numerous aphids which are white in color. Occurs on Witch-hazel (*Hamamelis virginiana*). Common.

*Poplar Stem Gall (Pemphigus populicaulis).*

An irregularly spherical gall developed at the junction of the petiole and blade of leaf. The opening is as wide as the gall and is at one side of the base of the pouch. It is hollow, about 11 m.m. in diameter, containing large numbers of aphids. Occurs on Cottonwood (*Populus deltoides*). Common.

*Hickory Cone Gall (Phylloxera Caryaefallax).*

This is a cone-shaped gall about 3 m.m. in diameter which occurs rather uncommonly on Hickory in this district. The gall is on the upper surface of the leaf, the opening being in a smaller cone upon the under surface. The gall is monothalamous, and contains numbers of small white aphids. It is green in color, and the opening is fringed with hairs. Occurs on Shell-Bark Hickory (*Carya alba*). Not common.

*Vein Gall on Hickory (Phylloxera caryaevenae).*

This gall consists of a fold of the main veins running from the midrib to the edge of the leaf. Above it is ribbed by the vein running along it. It is 5 m.m.-1 c.m. in length and 1-1.75 m.m. wide and 1.5-3 m.m. high. The galls are red. From the ventral side they appear as slits along the vein, lined with white thick hair. The gall is hollow and contains eggs, small aphids and a stem mother. The eggs are oval and transparently white and the gall is grooved inside, evidently for the purpose of holding them. The galls begin to appear in May, and are mostly empty by August. The larvae, according to Pergande, conceal themselves in cavities of the bark, or in deep depressions in the trunk and stem after leaving the gall, where they feed upon the juices of the tree. Occurs on Shell-Bark Hickory (*Carya alba*). Not common.

*Cottonwood Midrib Gall (Pemphigus sp.)*

A somewhat elongated pouch-like gall of aphid origin growing on the midrib of the leaf of the cottonwood, about halfway between the base and the apex of the leaf, and never on the leaf at the junction of the petiole and blade like *P. populicaulis*. Also instead of being irregular globular as is the latter, this gall is pouch-shaped, about 1-1.5 c.m. broad. Occurs on Cottonwood (*Populus deltoides*). Common.

*Hackberry Nipple Gall (Pachypsylla celtidis-mammae).*

A woody gall with bluntly rounded apex and slightly constricted at the point of attachment to the leaf. It is found on the underside of the leaf and opposite the gall is a concave depression. Occurs on Hackberry (*Celtis occidentalis*). Common.

*Hackberry Blister Gall (Pachypsylla celtidis-vesiculum).*

Circular spot-like galls on the under side of the leaf with a small nipple in the middle. Occurs on Hackberry (*Celtis occidentalis*). Common.

*Sumac Tomato Gall (Pemphigus rhois).*

Large, smooth, rounded galls, somewhat resembling a tomato in shape. Yellowish green in color and sometimes tinged with red. The interior is hollow and filled with lice. Occurs on Sumac (*Rhus typhina*). Common.

*Woolly Aphis Gall of Elm.*

The lice may be seen in large clusters on the trunk and branches of the tree. They suck the juices from the bark and cause knot-like swellings to appear. These galls sometimes attain a diameter of two or three inches. Occurs on many species of Elm (*Ulmus* sp.). The one from which this gall was described was a young American Elm (*Ulmus Americana*). Common.

*Woolly Aphis of Apple.*

This species of woolly aphis live in small colonies and produce small swellings on the young twigs. The galls often become twice the diameter of the stem upon which they are feeding. Occurs on Apple (*Pyrus malus*). Common.

*Grape Phylloxera (Phylloxera vastatrix).*

Small galls on either upper or lower surface of the leaf. Another generation of this insect forms galls upon the roots, and it is in this stage that it causes considerable destruction among the cultivated varieties. Occurs on wild and cultivated Grapes. Very common on Wild Grape (*Vitis vulpina*).

LEPIDOPTERA.

*Elliptical Goldenrod Gall (Gelechia gallaesolidaginis).*

A large elongated stem gall. It is about one inch in length and monothalamous. The larval chamber is quite large. It remains over winter in the pupal stage and the imago emerges in the spring. Occurs on Goldenrod (*Solidago* sp.). Common.

*The Locust-Twig Borer (Ecdytolopha insiticiana).*

Oval swellings on the branches and twigs, varying from 2-4 cm. in length and about a cm. in thickness. Generally occurring at the junction of the leaf petiole with the branch, about which point the wood is destroyed and a mass of castings and sawdust surrounds the hole entering the gall. The tunnel of the gall maker runs some distance, and at the bottom of it is a reddish-brown larva about half an inch in length with a light-brown head.

COLEOPTERA.

*Willow Branch Gall (Saperda concolor).*

Large, rough galls on the stems of the willow and cottonwood. The galls are smooth at first, but become rough later in the season. The affected portions are very weak and easily broken off by the wind. Occurs on Willows and Cottonwood. Common.



*Red-necked Blackberry-borer (Agrilus ruficollis).*

Symmetrical swellings of the Blackberry cane. The gall is about one-third greater in diameter than the normal cane. The larva makes a channel in the centre of the gall. Occurs on Blackberry. Not common.

DIPTERA.

*Vein Gall of Blue Beech (Cecidomyia pudibunda).*

This gall consists of a fold of the leaf along the veins. It is not very much thickened and is generally constricted near the leaf, forming a long, hollow tube. The opening to the gall is on the underside and runs the full length of the gall. It is lined with white pubescence in much the same way as the Phylloxera on Hickory. Inside the gall, which is hollow, are found a few very small orange-colored larvæ. The gall is quite red in color. Occurs on Blue Beech (*Carpinus Caroliniana*). Common.

*Ball Gall on Wood Nettle (Cecidomyia urnicola).*

This gall is somewhat similar in structure to the gall on the fruit of the wood nettle, but is much smaller, much lighter in color and uniformly monothalamous, whereas the gall on the fruit is sometimes polythalamous. The larvæ are also somewhat smaller than those on the fruit. The galls occur either on the upper or lower surface of the leaf. Numerous small inquiline Hymenoptera were hatched from this gall. There is no opening in the gall. Occurs on Wood Nettle (*Laportea Canadensis*). Common.

*Pine Cone Willow Gall (Cecidomyia strobiloides).*

A mass of closely imbricated leaves at the end of a twig, caused by the arrest of growth at the end of the stem. Regularly cone-shaped. In the centre, surrounded by a thin, transparent covering, is a small orange larva. Occurs on *Salix discolor* and many other species of scrub willows. Common.

*Oak Fold Gall (Cecidomyia niveipila).*

Consists of a dense white pubescence upon the under side of the leaves, causing a distortion and folding of the leaf blade. The pubescence is inside the fold, forming the lining of the gall. Occurs on Red Oak (*Quercus rubra*). Common.

*Wild Cherry Bud Gall (Cecidomyia serotinae).*

A club-shaped, monothalamous gall with one or two leaves growing from its sides. The gall is an enlargement of the terminal buds of young shoots of the Wild Cherry. Occurs on Black Cherry (*Prunus serotina*) and Chokecherry (*Prunus virginiana*). Common.

*Eye Spot Gall of Maple (Cecidomyia ocellata).*

This is a dimple gall surrounded by an areola. At first the gall is entirely green, but at maturity the nipple turns a rich red, the areola surrounding it becomes light yellow in color and a thin line surrounding this turns deep pink in color. The successive rings of color very much resemble a target. In the cavity formed by the underside of the gall rests a small white larva, covered with a viscid secretion. Later in the season the gall turns black and drops out, leaving a circular hole.

This gall has been usually placed as *Sciara ocellata*, but most authorities, including Osten Sacken himself, now place it as *Cecidomyia*, attributing the presence of the *Sciara* to an error in the rearing. Occurs on Red Maple (*Acer rubrum*) and Soft Maple (*Acer dasycarpum*). Common.

*Grape Vine Tube Gall (Cecidomyia viticola).*

A long conical, cylindrical tube-shaped gall, about .7-1 cm. in length by 1.5-2 m.m. in diameter near the base, where it is attached to the leaf by a slight constriction. It tapers to a point at the tip. Monothalamous, containing several minute larvæ. It is green or bright red in color and occurs on the under side of the leaf. Occurs on Wild Grape (*Vitis* sp.). Not common.

*Basswood Wart Gall (Cecidomyia verrucicola).*

Small swellings on leaf of basswood, appearing in May or June. About 3 m.m. in diameter, protruding from both sides of the leaf about 1 1-2 m.m. The upper side has a dimple in the centre. Red above and green below. Open in the fall by means of a circular lid upon the underside. Contains small larvæ. Occurs on Basswood (*Tilia Americana*). Very common.

*Burr Gall on Hawthorn (Cecidomyia bedeguar).*

This is a small cylindrical gall, hollow, red or green in color, about 3 m.m. in height and diameter, and with a hole in the top of it. The top of the gall around the hole is thickly set with spines, making the gall look somewhat like a burr. Inside it are found many small orange-colored larvæ about 1.5 m.m. long. It is monothalamous and occurs on the upper side of the leaf. Occurs on Hawthorn (*Crataegus* sp.). Common.

*Cherry Pocket Gall (Cecidomyia virginiana).*

This gall consists of a malformation of the fruit. The pit or stone is absent and the fruit is enlarged, forming a thick-walled pouch about 1 cm. in length by 5 m.m. in width by 1.5 m.m. in thickness. The gall contains from 10 to 15 larvæ. It has no opening, but later the fruit becomes loosened from the peduncle and leaves an opening. The larvæ leave the gall in June or July. Occurs on *Prunus virginiana*. Very common.

*Ash Midrib Gall (Cecidomyia peller).*

This gall is caused by a swelling and folding of the midrib of the leaflets, the thickening being greatest at the midrib and extending towards the edges of the leaf, often involving nearly the whole of it. The thickened portion is folded together, giving the leaflet the appearance of a bean or pea pod. A small cavity is left at the bottom of the gall which runs the whole length. In this cavity are found minute larvæ, feeding on the green succulent tissue of which the gall is composed. The underside of the leaf is always the outside of the gall. Occurs upon the leaflets of White Ash (*Fraxinus Americana*). Not common.

*Box Elder Midrib Gall (Cecidomyia negundinis).*

Swellings on the midrib of the leaflets of the Box Elder, much resembling *Cecidomyia peller* on the White Ash. The swellings form two long circular chambers, one on either side of the midrib, opening on the upper surface by slits running the whole length of the gall. Occurs on Box Elder (*Acer negundo*). Not common.

*Ball Gall on Hickory (Diplosis caryæ).*

Thin-walled galls, about 3 m.m. in diameter, hard and brittle, attached to the underside of the leaves of *Carya alba* by a projection at the base, which appears upon the upper side as a black dot, surrounded by a light yellow areola. The gall has no opening and contains a very small larva. The hypertrophy is monothalamous. The exterior of the gall is smooth or slightly pubescent. Occurs on *Carya alba*. Common.



*Tulip Tree Midrib Gall (Cecidomyia tulipifera).*

Hollow swellings, varying from .5 to 2.5 cm. in length by 3-4 m.m. in width, on the midrib and lateral veins of the leaves of the tulip tree. Monothalamous. Occurs on Tulip tree (*Liriodendron tulipifera*). Not common.

*Spiræa Pod Gall (Cecidomyia salicifolia).*

The leaves are folded in such a way as to assume the appearance of a pod. The pod is formed by the folding of the leaf along the midvein, and the bulging out of the sac thus formed, the outer margin of which is closely united. The pods vary in size, the largest being about five-eighths of an inch long. Occurs on Spiræa (*Spiræa tomentosa*). Common.

*Willow Club Gall (Cecidomyia rigida).*

This gall is formed on the lateral shoots of the Bush Willow, an enlargement of the whole stem, tapering from the centre to both ends. Occasionally galls are found having terminal shoots growing from them. The gall is about three-quarters of an inch long. Occurs on several species of Bush Willow (*Salix* sp.).

*Goldenrod Bunch Gall (Cecidomyia solidaginis).*

It is found on the main stalk of Goldenrod. An apical gall which prevents the natural elongation of the stem. This unnatural accumulation of several hundred leaves into a globular mass is the result of injury to the terminal bud and consequent arrest of growth in length. Occurs on Goldenrod (*Solidago* sp.). Very common.

*Goldenrod Ball-Gall (Trypeta solidaginis).*

This is a globular ball-like enlargement of the stem of Solidago, about 2½ cm. in diameter. Pithy in structure, hypertrophy monothalamous, the central cell irregular in shape and containing a large fat larva which develops into a fly with banded wings. It is green in summer and woody in winter. Occurs on Goldenrod (*Solidago* sp.). Very common.

*Vein Gall on Oak (Cecidomyia quercus-majalis).*

These galls are produced along the veins or the under side of the leaves of the Red Oak. They are, narrowly oval, inflated galls much like the *Cecidomyia pudibunda* on Carpinus. The surface of the gall is netted with veins. The wall is quite thin. The opening to the gall is upon the upper side of the leaf, and runs the full length of the gall. The gall is hollow and the interior wall smooth. Green or brown in color. Occurs on Red Oak (*Quercus rubra*). Not common.

*Hickory Nut Gall (Cecidomyia caryæ-nucicola).*

A malformation of the nut produced by a Cecidomyiid, resulting in the formation of large irregular knobs all over the husk of the nut, containing thickwalled cells. Hypertrophy polythalamous. Occurs on Hickory (*Hicoria Alba*). Not common.

*Alder Bud Gall (Cecidomyia serrulata).*

A rounded monothalamous bud gall, a deformation of the terminal bud of the Alder. Occurs on Alder (*Alnus* sp.). Not common.

*Midrib Gall on Virginia Creeper (Cecidomyia sp.).*

This gall is green and succulent. It forms along the midrib of the leaf and occasionally along the side veins. It is flat and generally double, that is, on both sides of the vein. It is on the under side of the leaf and is really an enlargement or thickening in a fold on the leaf near the midrib. It

varies from 1.5 to 4.5 cm. in length, and from .8-1 cm. in width and .4-.6 cm. in thickness. Through the gall runs a single chamber about 1 mm. in diameter. The opening to the gall runs the whole length of the gall and is on the upper side of the leaf. The opening is lined with minute white hairs. In the gall are minute orange larvæ about 1.5 mm. x .6 mm.-2 mm. Occurs on Virginian Creeper (*Ampelopsis quinquefolia*). Common at Guelph.

*Midrib Gall on Touch-me-not.*

An enlargement of the petiole or midrib of the leaf, protruding on both sides of it and averaging about 1 cm. in length x .4 cm. in width. Green, smooth and monothalamous. A single chamber running the length of the gall and containing several minute white larvæ. Occurs on Touch-me-not (*Impatiens fulva*). Common.

*Fruit Gall on Wood Nettles.*

This gall consists of a malformation of the fruit of the woodnettle and sometimes all the fruiting stem is covered with them. The gall is juicy and quite soft in structure and in shape is a long oval with a pointed apex and sessile. The hypertrophy is variable, being sometimes mono and sometimes dithalamous. In the larval chamber, which is about 1 mm. in diameter and surrounded by light colored tissue, are one or two small fat larvæ light brown in color. The larva is segmented and legless. The gall is about .5 cm. in diameter and 1 cm. in length. It is green in color. Occurs on Wood Nettle (*Laportea Canadensis*). Not common.

*Willow Egg Gall (Euura ovum).*

Oval galls on the sides of the twigs of the Bush Willow. The galls are hard and woody and usually the same color as the stem. Occurs on Bush Willow (*Salix sp.*). Common.

*Dogwood Club Gall (Cecidomyia clavula).*

The galls are club-shaped and about 2 cm. in length. Inside is an elongated channel containing a single larva. They are found on the terminal twigs and the color is about the same as the bark. Occurs on Flowering Dogwood (*Cornus florida*). Not common.

*Oak Spangles (Cecidomyia poculum).*

Saucer-shaped galls in clusters on the under surface of the leaf. Usually pale red in color. Occurs on White Oak (*Quercus alba*). Common.

HYMENOPTERA.

*Acraspis macrocarpa.*

This beautiful little gall occurs quite commonly upon the leaves of *Quercus macrocarpa* in this vicinity. It is small, average diameter 3 m.m., and in form globular to oval. Above, it is bright red, fading to yellowish green near the base, where it is joined to the leaf by a small portion of the surface so that it is easily detached without injuring the leaf. The surface of the gall is netted with innumerable fissures, between which are small elevations with very short spines. When on the underside of the leaf the gall is white in color. It is monothalamous and the smooth, hollow chamber contains a single small white larva. The galls occur along the veins.

They much resemble *Cynips pisum*, but are monothalamous and also resemble *Cynips echinus*, but the spines on this gall are scarcely noticeable and *Cynips echinus* and *Cynips pisum* are both polythalamous. Occurs on Burr Oak (*Quercus macrocarpa*). Common.



*The Oak Petiole Gall (Andricus petiolicola).*

This is a midrib or petiole gall. It is hard and woody and projects on one side, generally on the lower. It averages 1.2 cm. by .7 cm. and 8 m.m. wide. It contains several cells lined with hard white tissue which in some cases are arranged like the seed cases in a core of an apple. In each of these is a small white larva, apparently legless, and covered with a viscid transparent secretion. The gall is green or red and more or less roughened on the outside. Occurs on White Oak (*Quercus alba* and *Quercus prinoides*). Common.

*Rose Root Gall (Rhodites radicum).*

A smooth, irregularly rounded, brownish swelling upon the root of the Wild Rose. Reddish brown in color, quite light and pithy in structure and containing numerous cells. From 3 to 5 cm. in diameter. Occurs on roots of Wild Rose (*Rosa* sp.). Not common.

*Spiny Ball Gall on Wild Rose Leaf (Rhodites bicolor).*

This is a very beautiful little gall which is rare in this vicinity. It is monothalamous and is formed upon the leaf of the wild Rose and sometimes all the leaflets are transformed in this way. The gall is a thin-walled ball, red or green in color and covered with short spines. It is monothalamous and contains one small larva about  $\frac{3}{4}$  m.m. long. The gall is about .75 cm. in diameter. The wall is about  $\frac{1}{4}$  m.m. thick. There is no opening. The inside is quite smooth. Occurs on Wild Rose (*Rosa* sp.). Not common.

*Rose Stem Gall (Rhodites globulus).*

This gall is found upon the stem of the Wild Rose. It consists of an abrupt corky enlargement of the stem. It is about 2-2.5 cm. in length and about 1-1.5 cm. in width. It is quite smooth on the outside, not at all pubescent, and green or red in color. A single long chamber runs longitudinally through the gall about 3 m.m. in diameter and irregular in shape. In this are small larvæ about 3 m.m. in length. The larva is dark grey with a lighter head and tail and is legless. Occurs on Wild Rose (*Rosa Carolina*). Not common.

*Mossy Rose Gall (Rhodites rosæ).*

It is composed of a mass of hard, small cells clustered around a branch or twig. These cells are covered with a dense thick mass of green filaments which grow from them. The gall is monothalamous and from 1.5-2 cm. in diameter. Occurs on Wild Rose (*Rosa Carolina*). Common.

*The Larger Oak Apple (Amphibolips confluentis).*

Thin walled and globular, about 4 cm. in diameter. Exterior surface smooth (not pubescent) and somewhat irregular. Interior filled with a spongy mass of fibres, very loosely attached to the exterior but tightly attached to an interior woody cell in which the larva lives. Green in the early part of the season, later turning brown and brittle. Generally produced on the upper part of the leaf from the end of one of the veins. Occurs on Red Oak (*Quercus rubra*) and other closely related species. Common.

*Hedgehog Gall on Oak (Acraspis erinacei).*

A round or oval gall growing on the midrib of the leaf. About 1 by 5 c.m. The gall is white or yellowish and covered with fine bright pink or red spines about 1-2 m.m. in length. Attached to the leaf at a point about

the middle of the under side of the gall. Hypertrophy polythalamous. Larval chambers about 1-2 m.m. in diameter. It is found on the upper side of the leaf. Occurs on White Oak (*Quercus alba*). Common.

*Furry Ball Gall on Oak (Neurotus floccosus).*

This is a small spherical gall about 3 m.m. in diameter, which occurs on White Oak on the veins of the leaves upon the under side of the leaf. The gall is thickly covered with fine short hair which forms a cushion all round it. The gall is rather hard, and in the centre of it is a very small thick-walled shell about .25 m.m. in diameter. Occurs on White Oak (*Quercus alba*). Not common.

*Pointed Bullet Gall on Oak (Holcaspis duricaria).*

A spherical ball-like gall produced upon the stem of White Oak and Burr Oak. A short point at the apex of the gall distinguishes this species from *globulus*. Hard and woody, with a small cavity in the centre, containing a small, oval monothalamous, thin-walled, larval chamber. Occurs on Burr Oak (*Quercus macrocarpa*). Common.

*Little Oak Apple (Andricus palustris).*

This gall is produced by a malformation of the leaf blade, nearly always at the outer edge. It is a spherical, monothalamous, hollow ball, projecting from both sides of the leaf. It is from .9-1 cm. in diameter and comparatively thin-walled. The interior cavity is lined with smooth tissue and contains only a small thin-walled ball which rolls about freely in the gall. The single chamber of this ball contains a small larva. This ball is about 2 m.m. in diameter. The insect emerges, through a small hole cut in the side of it, in May. The gall is green or green and red. Occurs upon the leaves of Pin Oak (*Quercus palustris*). Not common.

*Oak Midrib Gall (Andricus piger).*

This gall is an irregular, woody swelling of the midrib of Burr Oak. It averages about 7/8 inches in length, and about 5/8 inches in diameter. Externally it is green, glabrous or slightly pubescent and projecting on both sides of the leaf. Internally it is dense and somewhat woody in structure, and containing numerous small cells about .5 m.m. in diameter, surrounding each of which is a layer of harder tissue. These are the larval cells. The gall-flies escape early in June through holes cut through the gall. Occurs upon leaves of Burr Oak (*Quercus macrocarpa*). Common.

*Furry Ball Gall on Oak (Andricus lana).*

This gall is produced upon the midrib upon the under side of the leaf of the Burr Oak. It is a white, furry, hemispherical mass, varying from 4-11 m.m. in diameter. This is composed of innumerable fine, woody fibres to which are attached small round kernels, in each of which is a minute white larva. These kernels are attached to the midrib of the leaf. Occurs upon leaves of Burr Oak (*Quercus macrocarpa*). Not common.

*Willow Apple Gall (Pontania pomum).*

A smooth, fleshy, sessile, globular or slightly oval monothalamous gall, like a miniature apple. About 1 c.m. in diameter, growing on one side of the midrib of the leaf and extending to its edge or beyond it. The principal part of the gall projects from the underside of the leaf. Color greenish yellow, often with a rosy cheek. Mature about July 31st. Occurs on many species of scrub willows (*Salix* sp.) Common.



*Flat Galls on Willow (Pontania hyalina).*

Fleshy galls, occurring in two parallel rows, one on either side of the midrib, sometimes touching, but not originating from the latter and rarely extending to the edge of the leaf. Sometimes as many as twenty to a leaf. In other cases confined to a row on one side of the leaf, or occasionally occurring singly. Shape irregular, elongate-ovate, projecting equally in both surfaces of the leaf. Color on upper side more or less brownish red, beneath white with slight purplish tinge. "Eggs and larva are subject to attack of mites, thrips, a curculionid (*Anthonomus sycophanta*) and a lepidopterous larva which eats out the entire interior of the gall tenthredinid larva and all." (From Marlatt. "Revision of Nematinae.") Occurs on many species of scrub willow (*Salix* sp.). Very common.

*Pithy Blackberry Gall (Diastrophus nebulosus).*

A large, oblong, polythalamous stem gall, 1 to 3 inches in length, and 1 to 1½ inches in thickness. The surface is uneven with deep longitudinal furrows, which divide the gall more or less completely into four or five portions. Occurs on Blackberry (*Rubus* sp.).

*Lettuce Tumor Gall (Aulax timidus).*

It occurs on the stem of Wild Lettuce. It is an irregular, oval, polythalamous, knotty enlargement of the stem varying greatly in size. The interior is soft and pithy. Occurs on Wild Lettuce (*Lactuca Canadensis*). Not common.

*Oak Button Gall (Neuroterus umbilicatus).*

This gall appears as a small button-like enlargement on the upper and lower surfaces of the leaves of the Oaks. Occurs on Burr Oak (*Quercus macrocarpa*). Not common.

*Oak Bullet Gall (Holcaspis globulus).*

It is found on the twigs of many species of Oak. It is a smooth, round, monothalamous gall. The interior is corky, with a small lighter coloured oval cavity in the centre, containing the larva. It grows singly or in clusters of two or three. Occurs on Burr Oak (*Quercus macrocarpa*), and White Oak (*Quercus alba*). Common.

*Oak Pea Gall (Cynips pisum).*

This is a spherical dithalamous gall, resembling a small pea. The surface is fissured or netted with depressions between which are elevations. It resembles a small pea. Occurs on White Oak (*Quercus alba*) and Burr Oak (*macrocarpa*). Not common.

*Barley Jointworm (Isosoma hordei).*

A small gall forming a woody growth which fills up the cavity of the stalk and causes the joints to swell, and the stalk to topple over. The larva remains in the straw over winter, and the adults emerge in the spring.

*Huckleberry Gall (Solenogopheria vacinii).*

Rounded or elongated galls 1-2 c.m. in diameter on the stem of the huckleberry. They are green or red in summer, and brown, hard and woody in winter. Occurs on Huckleberry (*Gaylussacia resinosa*). Common.

## HEMIPTERA.

By REV. THOMAS W. FYLES, D.C.L., F.L.S., LEVIS, P.Q.

Bugs! "Disgusting!" says the fair reader who may chance upon this article; and truly I agree with her. I have no word bad enough for "the terror that walketh in the darkness"—the old, original "bug-a-boo."

I shall never forget a night I spent on board a small river-steamboat. The vessel left its wharf very early in the morning, and a friend (?) persuaded me to take a berth on board. What a night I spent. No sooner were the lights put out, than I began to experience a creepy sensation that effectually "murdered sleep." (Fig. 18.)

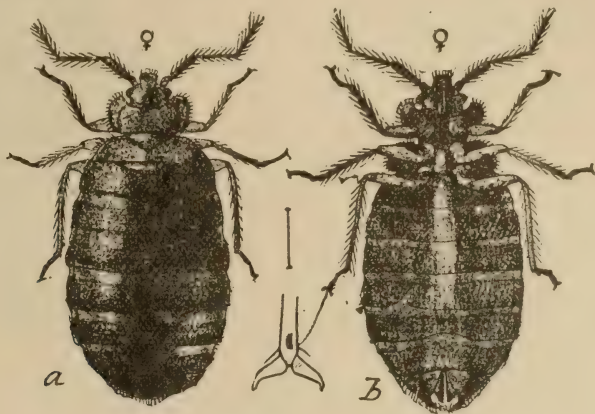


FIG. 18.—Female Bed-bug, much enlarged, a, upper, and b, under surface (after Marlatt.)

Confined in a small crib, and having no light, my case was worse than that of a certain church dignitary and his chaplain who, when on a visitation tour, sought shelter in a cottage. late one night. They were welcomed gladly; and the only spare-bedroom was placed at their service. On retiring the great man turned down the bed-clothes, but quickly turned them back again, for there were things in possession of the bed. He thought discretion the better part of valour, took his valise for a pillow, wrapt his long cloak around him, and stretched himself upon the floor. There he soon slept the sleep of the just. Meanwhile his companion, ensconced in an arm-chair, amused himself by writing a parody on some well-known lines. One verse of his production read thus:—

"No dirty blanket enclosed his breast;  
Nor in sheet, nor in quilt we wound him;  
But he lay like a clergyman taking his rest  
With his camlet cloak around him."

In my entomological investigations in the Province of Quebec, I have met with representatives of the undermentioned families of bugs:—

Corimelænidæ.  
Pentatomidæ.  
Coreidæ.  
Lygæidæ.  
Capsidæ.  
Acanthiidæ.  
Tingitidæ.  
Aradidæ.

Phymatidæ.  
Nabidæ.  
Reduviidæ.  
Hydrobatidæ.  
Belostomatidæ.  
Nepidæ.  
Notonectidæ.  
Corisidæ.



I shall not attempt to give an orderly and systematic account of the various species, belonging to these families, that have come in my way. The space at my disposal in the report will not admit of this. I shall tell, in a desultory way, of some of the more remarkable and interesting of the species, mentioning the family to which each of them belongs.

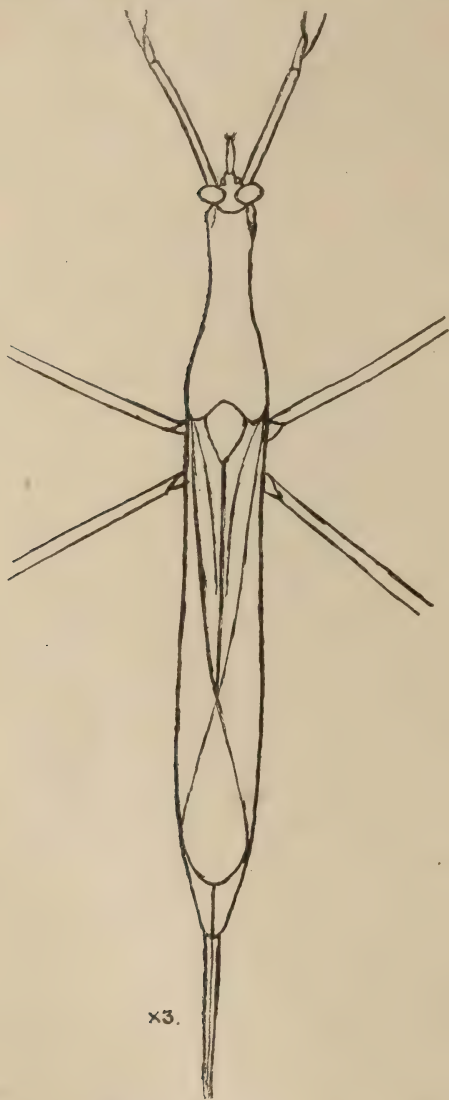


FIG. 20.—*Ranatra quadridentata* (greatly enlarged).

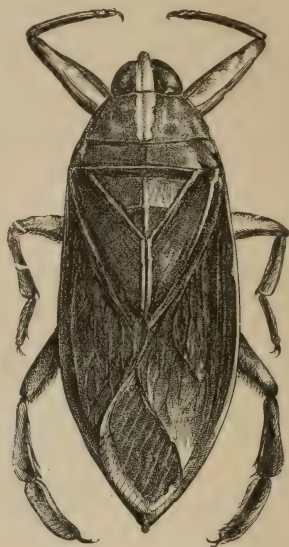


FIG. 19.—Giant Water-bug.

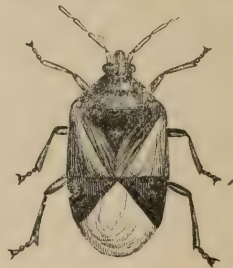


FIG. 21.—A typical Bug.



FIG. 22.—*Corimelena atra*.

First then, the Giant of the Bugs, far beyond all others of our bugs in size and strength, is *Belostoma Americanum*, Leidy, (Fig. 19), belonging to the *Belostomatidae*. This creature attains a length of nearly two and a half inches, and an expanse of wings of four inches. Its hindmost pair of legs are an inch and three-quarters long, and are used for propelling it through the water. The colour of the insect is dark brown. In the breeding season it occasionally leaves the water; and it is capable of long flights. Its wings are true bug-wings, having the upper part horny, and the lower

part membranous. Its eyes protrude and resemble shining black beads. It has a stout proboscis for piercing its prey, which consists of fishes, tadpoles, etc. Its long stout front legs terminated with sharp claws enable it to grasp its victims firmly.

Another remarkable water-bug is *Notonecta undulata*, Say, belonging to the *Notonectidae*. This insect is boat-shaped, but the keel is along its back; so it swims with its back downwards—its long legs bending over its sides, and serving as oars. In its movements it reminds one of a boy swimming on his back.

A still more noteworthy insect is *Ranatra quadridentata* (Fig. 20), belonging to the *Nepidae*. Length is the characteristic of this insect. It has a long slim body, long thin legs, long antennæ, and long terminal respiratory tubes; its front legs are constructed for grasping its prey. It frequents shallow streams, *walking on the bottom*, and lifting the tips of its breathing tubes to the surface for air.

But, if it is wonderful to see a winged insect walking at the bottom of the water, it seems all but miraculous to behold one walking with ease and swiftness on the top. Yet this is the habit of *Hygrotrechus remigis*, Say, and also of *Limnoporus rufoscutellatus*, Fab., both of which are common with us. The former is black; the latter, pale reddish brown. Both belong to the *Hydrobatidae*.

Of bugs that frequent plants, the Negro Bug (Fig. 22), *Corimelæna atra*, Am. et Serv., in the *Corimelænidae*, is particularly obnoxious. It lays its eggs on small fruits, raspberries, etc. Should a person, by mischance, put a berry that has been visited by the bug into his mouth, a most nauseating taste and smell will quickly cause him to eject it. The bug is a pretty, compact little insect, of a shining black, and almost as broad as it is long. It is often seen on wild strawberry plants; and, when disturbed, it scuttles away to the underside of a leaf.

An insect of economic importance is found in the *Pentatomidae*. I refer to *Stiretrus fimbriata*, Say. It preys upon the Potato Beetle, *Doryphora decem-lineata*, Say. Unfortunately, it shares the fate of the beetle and is poisoned by Paris Green. *S. fimbriata* is really a handsome insect. Its dark brown wings and deep red thorax outlined with crome-yellow; and it has a peculiar mark, in the middle of the back, of the same colour, and, in shape, resembling an elongated horse-shoe.

Another useful bug is *Podisus placidus*, Uhler (Fig. 23), belonging to the same family as the foregoing. It preys upon the Imported Currant-worm, *Nematus ventricosus*, Klug., and other larvæ. A description of this bug will be found on page 342 of Saunders' "Insects Injurious to Fruits."

In the same genus comes *Podisus cynicus*, Say, a fine bug seven-twelfths of an inch long, and four-twelfths wide. It is of a reddish-brown colour, slightly mottled with black.

A very pretty little bug in this family is *Cosmopepla carnifex*, Fab. It is black, bordered with red, and crossed on the thorax with red. It has also two red spots on the back.

Another fine insect in the same family is *Euschistus fissilis*, Uhl. It is half an inch long and one-third of an inch wide. In colour it is ochreous or pale brown, and it is thickly covered with minute black dots.

A somewhat smaller insect is *Euschistus tristigma*, Say. Its body colour is darker than the preceding; and the flattened edges of the abdomen are marked with alternate black and orange patches. The wings of this species are splendidly iridescent.



A third insect that comes, I think, in the same family is *Homæmus ænifrons*, Say. It is reddish-brown in colour, clouded with darker brown; and it has a peculiar mark, like an elongated cone rising from the end of the abdomen towards the middle of the back. These creatures frequent the heads of grass.

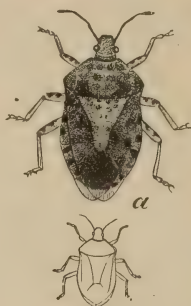
*Acanthosoma cruciata*, Say, is an interesting species in the *Pentatomidæ*. In colour it is ochreous with brown markings, and it has the appearance of having been oiled and varnished. Its back is marked with a floriated cross. When the wings are spread the abdomen on the upper surface is seen to be tinged with vermillion.

But the finest of our species of *Pentatomidæ* is undoubtedly *Pentatoma ligata*, Say. It may readily be known. It is a robust insect, of a rich Brunswick green, bordered with orange red; and it has an orange spot on its back. The insect is somewhat rare at Quebec.

In the family *Coreidæ*, to which the common Squash-bug, *Anasa tristis*, De G., belongs, we have *Alydus eurinus*, Say—a dingy insect, long and narrow with lighter coloured wings.



FIG. 24.—Assassin Bug.

FIG. 23.—*Podisus placidus*.FIG. 25.—*Acholla spinosa*.

In the *Lygæidæ* we have the pretty bug *Lygæus turcicus*, Fabr. This insect is a long oval in shape, black, with a red band across the shoulders, and a red St. Andrew's Cross upon the back. The underside of the abdomen is lurid red.

Among the bugs injurious to plants may be reckoned *Pecilocapsus lineatus*, Fab., (*4-vittatus*, Say), a pretty yellow bug, with black lines on the wings, and two very conspicuous black spots on the thorax. These insects do injury to the leaves of currant bushes and garden plants; and they also taint the small fruits. They and the next mentioned insect belong to the *Capsidæ*.

*Capsus lineolaris*, Beauv., the Tarnished Plant-bug is ochreous with fuscous shades. It has dark spots along the edge of the abdomen. These insects damage the leaves of pear trees, apple trees, etc.

The *Tingitidæ* are a remarkable family of bugs. The species are very small and very elegant. Seen under a microscope, they appear to be covered with lace-work. On account of this, they have been called "Lace Bugs." The common species is *Corythuca arcuata*, Say. I have found a beautiful species on the Island of Orleans that I have not yet identified. The insects are found on the underside of Alder leaves.

The "Flat Bugs" or *Aradidæ* are found under bark, and in crevices of trees. They are predaceous. In vol. XXXV. of the *Canadian Entomologist*, I have given a full description of a new species that I have taken at Quebec, and have named *Aradus luteolus*.

A bug of remarkable shape is *Coriscus subcoleoptratus*, Kirby, in the family *Nabidæ*. It has the head and thorax narrow, and the abdomen greatly widened in proportion to the size of the insect. It is suggestive of a flask. Its body colour is black, but the abdomen has a yellow border. The legs and long sharp proboscis are yellow. Its wings are very diminutive.

In the late summer when our country road sides are adorned with the Golden Rod, the pretty little Fritillary, *Argynnis Myrina*, Cram., may be seen in numbers sporting about the flower heads. Here and there one of these butterflies may be seen motionless—lifeless. If one will take the trouble to look into a case of the kind, he will probably find that the ill-starred insect has fallen into the clutches of a lurking foe, *Phymata erosa*, Fabr., belonging to the *Phymatidæ*. This strange insect is yellow beneath, and yellow marked with brown above. It has yellow legs and proboscis, and angulated thorax and abdomen. It lies back downwards among the blossoms of the *Solidago*, patiently awaiting its prey. A butterfly alights with outspread limbs. One of these comes within reach of the expectant bug. Instantly the extended tarsus of the bug springs back over the leg of the butterfly, and into a toothed groove in the disproportionately large tibia of the bug; and the victim is held securely, while its foe thrusts its long proboscis into its body and drains away its life juices.

I will mention only two other species—they are known as "Assassin Bugs," (Fig. 24) for they make other insects their prey. They belong to the *Reduviidæ*, to which the "Kissing Bug" of ill-repute, *Melanolestes picipes*, H.S., also belongs.

*Acholla multispinosa*, De G. (Fig. 25), is a brown insect, two-thirds of an inch long. It has a forbidding appearance, which is well, for it is a dangerous creature. On pages 73-5 of the Thirtieth Annual Report of the Entomological Society of Ontario, Dr. Bethune has given a well-authenticated account of the death of a child from a puncture from the proboscis of a bug of this species. The child was wounded under the knee, and blood poisoning ensued.

The other species is *Opisocætes personatus*, Linn. It is a larger insect than the last mentioned, being three-fourths of an inch long; and—with the exception of the under wings—it is wholly black, or very dark brown. When its wings are outspread, its abdomen is found to be hollowed out, like a scoop or spoon. This species enters houses in search of *Acanthia lectularia*, Linn. Its larva has the habit of covering itself with a coat of dust or mud, and, so disguised, escapes notice till its motions betray its presence.

I do not think the *Reduviidæ* go out of their way to inflict injury upon human beings. I think it may be said of them that, *unmolested*, they do not molest.

The late highly esteemed J. Alston Moffat once told that he had held a specimen of *A. multispinosa* firmly between his finger and thumb, while he searched for a pin wherewith to transfix it. The bug managed to get its head free, and then, *sent in its little bill for damages*, greatly to Mr. Moffat's discomposure.

Disagreeable as many species of the Hemiptera undoubtedly are, they yet serve valuable purposes in keeping down the numbers of other and injurious insects; and the habits of some of them are so remarkable as to claim more than a passing notice. In dealing with them the poet Cowper's rule is worthy of attention—*of course entomologists are exempt from it!* He says:—



"The creeping vermin, loathsome to the sight,  
 And charged perhaps with venom, that intrudes,  
 A visitor unwelcome, into scenes  
 Sacred to neatness and repose, th' alcove,  
 The chamber, or refectory, may die:  
 A necessary act incurs no blame.  
 Not so when, held within their proper bounds,  
 And guileless of offence, they range the air,  
 Or take their pastime in the spacious field;  
 There they are privileged: and he who hunts,  
 Or harms them there, is guilty of a wrong,  
 Disturbs th' economy of Nature's realm,  
 Who, when she formed, designed them an abode,  
 The sum is this. If man's convenience, health,  
 Or safety, interfere, his rights and claims  
 Are paramount, and must extinguish theirs  
 Else they are all—the meanest things that are—  
 As free to live, and to enjoy that life,  
 As God was free to form them at the first,  
 Who in His sov'reign wisdom made them all."

The Task—Line 568 to line 587.

## BASSWOOD, OR LINDEN, INSECTS.

BY ARTHUR GIBSON, EXPERIMENTAL FARM, OTTAWA.

The following notes on insects found feeding on basswood, *Tilia Americana*, are chiefly from records handed to the writer since the publication of a paper on the above subject which appeared in the 34th Annual Report of this Society, and of a further paper in the 35th Annual Report. In the first paper 94 species are listed, and in the 1904 Report further notes on some of these insects are given, as well as notes on 8 other species, which brought the list up to 102.

### ATTACKING THE FOLIAGE.

#### ORDER HOMOPTERA.

Mr. W. Metcalfe, of Ottawa, who has devoted considerable time to the collection and study of homoptera and hemiptera, has been good enough to give me 15 records, which I am glad to include here. All of the species found by him were on basswood.

103. The common "Buffalo-tree hopper," *Ceresa bubalus*, Fabr. Five specimens of a dark form taken, Ottawa, July 14, (Metcalfe).

104. *Telamona reclinata*, Fitch, Ottawa, July 1, (Metcalfe). Mr. Metcalfe tells me that he has taken later in July five specimens, all on basswood, of a species of *Telamona*, which does not seem to be *reclinata*.

105. *Ormenis pruinosa*, Say. Mr. Otto H. Swezey, in his "Preliminary Catalogue of the Described Species of the Family Fulgoridæ, of North America, North of Mexico" (Ohio Dept. Agric., Div. Nursery and Orchard Inspection, Bull. 3) mentions basswood among a great many other food plants of this homopterous insect. The insect is rare in Ontario.

106. *Lamenia vulgaris*, Fitch. Ottawa, July 1, (Metcalfe).

107. *Bythoscopus variabilis*, Fitch, var. Ottawa, June 19 to 24, (Metcalfe). This insect is a near relative to the very injurious grape vine leaf-hopper which is so abundant some seasons in Ontario.

108. *Agallia novella*, Say. Ottawa, June 24, (Metcalfe).

109. *Diedrocephala coccinea*, Forst. Ottawa, bred from basswood, maple and hickory, (Metcalf).

110. *Deltocephalus Sayi*, Fitch. Hull, Que., July 1, (Metcalf).

111. *Empoasca flavescens*, var. *Birdii*. Ottawa, Aug. 14, (Metcalf).

112. *Empoasca mali*, LeB. Hull, Que., June 24; Britannia-on-the-Bay, Ont., Aug. 7, (Metcalf). This insect, which is known as the apple-leaf hopper, is, according to Smith, "seriously troublesome in some years" in New Jersey, but it is not a pest of any importance in Canada.

113. *Typhlocyba rosæ*, L., the common rose-leaf hopper. Ottawa, July 1, (Metcalf).

114. *Typhlocyba querci*, Fitch, var. *bifasciata*, G. and B. Hull, Que., June 24; Britannia-on-the-Bay, Ont., Aug. 7, only found on basswood, (Metcalf).

#### ORDER HEMIPTERA.

115. *Lygus invitis*, Say. Hull, Que.; Ottawa; August, 60 specimens, (Metcalf). This insect belongs to the same genus as the common well known pest of garden plants, the Tarnished Plant bug, which is very abundant in many parts of Canada.

116. *Gargaphia tiliæ*. Walsh, Ottawa, taken only on basswood, August, (Metcalf). In Smith's List of New Jersey Insects, it is stated that this insect "ranges from New York to Virginia."

117. *Tingis arcuata*, Say. Hull, Que., July 1, (Metcalf). In Packard's Forest Insects the species is mentioned as having been found on the under sides of the leaves of the White Oak.

118. *Coriscus inscriptus*, Kirby. Ottawa, June 19, (Metcalf). Smith states that this insect "occurs from Canada to Virginia and California."

#### ORDER LEPIDOPTERA.

19 of 1903 List. *Ennomos alniaria*, L. Although the larva of this common moth has been recorded on several occasions by other writers as feeding on basswood, it was not until the past season that the caterpillar was found on that plant in the Ottawa district. At Meach Lake, Mr. C. H. Young collected a larva which pupated on Sept. 10.

119. *Smerinthus jamaicensis*, Drury. In the preparation of my first list of basswood insects, I omitted to include this species, the larva of which feeds on a variety of plants, such as elm, apple, plum, willow, poplar, ash, birch, basswood, etc. In Lugger's Fourth Annual Minnesota Report, plate XV., there is a good figure of the mature larva. In Canada, the species is widespread, occurring as far west as Medicine Hat, Assa., from which place, in 1900, eggs were sent to the Division of Entomology, by Mr. T. N. Willing. The eggs hatched on June 5, and notes were taken on the larval stages. The larvae were fed on willow and poplar.

120. *Mineola indigenella*, Zell. var. *nebulella*, Riley? In 1904 we reared from apple some specimens of a small moth which seems indistinguishable from this apple feeding species. The habits and appearance of our larvae, however, are different from those of *indigenella* as published by Riley and Saunders, and Dr. Fletcher thinks that it cannot be the same. On Sept. 20, 1905, the writer found on basswood three of the larvae, all on the upper side of the leaf. In each case the larva was resting under a slender tent of silk, which was about half an inch in width and nearly an inch in length. The three leaves were all put in the same breeding jar, but two days after collection I was surprised to see only one larva in the jar. On looking closely, however, I found portions of each of the other two, and there was no doubt



that a serious tragedy had taken place. The remaining specimen spun a cocoon in a fold of a leaf on Sept. 23. When mature the caterpillar is five-eighths of an inch long, body pale green, the black noticeably washed with yellow. Head rounded, green, marked with numerous small reddish-brown dots and large blotch-like spots, the small dots being particularly on upper portion of head. On each side of the body there is a dark brown stripe, broken in places, and touching these two stripes crossing the back is a series of conspicuous wide bands of the same colour. These and the side stripes have a very ladder-like appearance. The spiracles are black and very small, as are also the tubercles. From each of the latter there is a single pale hair. The feet are concolorous with the ventral surface of the body.

61 of 1903 List. *Apatela morula*, Grt. On several occasions recently the larva of this noctuid has been beaten from the foliage of basswood at Ottawa. The writer found the caterpillar on July 30 last, and Mr. C. H. Young collected mature specimens on Sept. 2 and 5. Other food plants are elm and apple. When full grown the larva is about two inches in length and is of a light olive grey colour. The head is black, and down the centre of the dorsum there is a wide, uneven, dark gray band, yellowish centrally. On body segments 4, 7 and 11 there is a conspicuous dorsal enlargement, which is bordered on the sides with black. Along the sides of the body are a series of V-shaped blackish marks, with the round black spiracle at the base. The hairs from the tubercles on the body are thin, whitish and rather inconspicuous. In March, 1901, Mr. Young found the cocoon of this moth under the bark of an elm tree, about four feet from the ground, and since that date in confinement, he tells me that two larvae entered soft dead wood to the depth of fully an inch and there pupated.

### OCCURRING ON THE BARK.

#### ORDER HOMOPTERA.

121. *Eulecanium cerasifex*, Fitch. On July 18, I collected some scales on basswood and elm. These were on the lower branches of some old trees growing near the Arboretum of the Central Experimental Farm. Through the courtesy of Dr. Howard, they were identified as the above species by Mr. Sanders. The scales were fairly abundant on both kinds of trees. In Mrs. Fernald's Catalogue of the Coccidæ of the World, the following food plants are given:—cherry, plum, peach, apple, pear, maple, oak, ash.

### BORING INTO THE WOOD.

#### ORDER COLEOPTERA.

122. The Cherry Flat-headed Borer, *Dicerca divaricatu*, Say. Specimens of this insect were found in basswood on July 9 last by Mr. Frank Morris, of Port Hope, Ont., on the shore of Rideau Lake, near the Narrows Locks, Ontario. This insect, which is well known as being destructive to cherry and peach trees, is common in Ontario, and always injuriously abundant on maple and beech, as also sometimes on pine, birch, hickory and other trees. The mature insect is a brownish, or blackish bronzy beetle, of rather stout build, from three-quarters to almost an inch long.

84 of 1903 List. *Parandra brunnea*, Fabr. From the same wood as the specimens of *Dicerca divaricata*, Say, were taken. Mr. Morris also collected 30 specimens of *P. brunnea*, Fabr. This insect, while it is sometimes found in numbers as occurred at Rideau Lake in July last, is an uncommon species. It is widespread in distribution. The grubs live in the wood of stumps and old trunks of various deciduous and coniferous trees, the beetles being found under the loose bark.

## INSECTS INJURIOUS TO ONTARIO CROPS IN 1906.

By DR. JAMES FLETCHER, DOMINION ENTOMOLOGIST, OTTAWA.

The weather conditions in Ontario during 1906 were very variable. In eastern Ontario the summer was exceptionally dry with two or three periods of excessive heat. The precipitation, however, for the whole province notwithstanding the shortage in the east was slightly above the average, and in western Ontario for the month of October was abnormally large. Crops were on the whole good in nearly all districts, both in quality and quantity.

GRAIN CROPS were little injured by insects. Spring wheat was particularly free from insect attacks of all kinds and little was heard of rust. Fall wheat was decidedly above the average, and the Hessian Fly seems almost to have disappeared. Not a single report of Joint-worm in Ontario crops was received. Barley was one of the best crops which has been harvested for many years. Oats in the western counties were heavy, and there was some difficulty in harvesting, owing to the crop being lodged by rain storms. In the eastern counties, the quality was high for the most part, although a few crops were light for lack of timely rains. Grasshoppers in a few localities reduced the yield by cutting off the grains just before ripening. Peas were a good crop and the Pea Weevil was hardly mentioned. The area being sown to this important crop is again gradually increasing. The corn crop throughout the province was exceptionally good, both for the silo and for grain.

Roots in the western counties were good, but in the east were rather small and dry for lack of fall rains. There was very little injury this year to turnips by the Turnip Aphis, the only reports of serious injury coming from the counties of Victoria, Durham and Northumberland. Potatoes in the east were small but of high quality. There was little complaint of loss from Potato Rot, largely due to the fact that farmers are spraying much more systematically than hitherto to control this destructive disease. The standard remedy, Poisoned Bordeaux mixture, made with six pounds of copper sulphate, four pounds of unslaked lime, and eight ounces of Paris green in 40 gallons of water, has given very satisfactory results wherever tried. The experiments carried on at Ottawa regularly every year by the Horticulturist of the Central Experimental Farm have proved conclusively that three sprayings of the fields, the first one being applied in the middle of July, and the subsequent ones two weeks apart afterwards, give very paying returns. A fourth spraying gives better results, but it seems difficult to get farmers to make this extra application. Cutworms, although little complained of, were abundant and destructive in some places. Wherever tried, the poisoned bran remedy surprised those who used it with its effectiveness. Even in an exceptional and widespread outbreak in the grain and sugar beet fields of the West, this same remedy proved so remarkably successful, that many letters were written to newspapers and agricultural journals, giving the results of trials by those who had benefited from it.

FODDER CROPS. Clover was attacked to some extent by the Clover-seed Midge, but on the whole, the crop of seed was above the average for quality. In the eastern counties, clover fields were remarkably thinned, owing to the mild winter with little snow, which was very severe on all meadows. The Black Army-worm, *Noctua fennica*, and the Clover Cutworm, both levied heavy toll on the very much reduced stand of clover. Rape, which is now being much more grown than formerly, was severely injured in several places by the caterpillars of the Small White Cabbage Butterfly, which appeared in vast numbers during the months of September and October.



An interesting observation was made on the Experimental Farm, where a field of late turnips was practically cleared of swarms of these caterpillars by the English Sparrow. The observation was made by Mr. B. Nothnagel, who watched them for several days, and by driving the birds away suddenly, induced them to drop their prey so that he might examine it. It is pleasing to have a good word to say for these very troublesome and destructive birds.

**VEGETABLES.** Carrots in gardens were attacked in a few places in the Ottawa district by the Carrot Maggot, or Carrot Rust Fly. This injury was not widespread nor quite so severe as in 1905. The remedies which gave the best results, were spraying the rows of plants immediately after they were thinned out, with a carbolic acid and soap wash, or with kerosene emulsion. Dusting the plants with hellebore was also apparently effective, but even in untreated beds, the insect disappeared about the beginning of July, and late sown carrots were entirely free of attack. The Onion and Cabbage maggots were conspicuously less destructive in many parts of the province than has been the case for some years. This report, however, was not applicable in all parts, as was evidenced by the large numbers of enquiries for a practical remedy. Such, however, it must still be acknowledged has not so far been discovered. Good results on small areas were secured by dusting the plants from the beginning of the season once a week with a light dressing of powdered white hellebore, either pure or mixed with three times its weight of land plaster. A remedy which has often been recommended in newspapers is to brush away the soil from the bulbs as soon as these begin to form. In experimenting with this remedy, it was found rather difficult to apply in certain soils, but on the whole gave good results, particularly where the treatment was supplemented by dusting with the hellebore powder.

The Asparagus Beetle was a rather serious pest to the growers of this highly esteemed vegetable, and extended its eastern range in the province considerably during the past season. It was a troublesome pest as far east as Toronto, and specimens of the larvae were found by the writer during September on a small bed of asparagus on the Experimental Farm at Ottawa. The mature beetles were reared later, and the species proved to be *Crioceris asparagi*. The remedies which have given the best results are dusting the plants when the larvæ occur, with a mixture of freshly slaked lime and Paris green. This is more effective if it can be done when there is dew on the plants, or when they are wet either from rain or after being sprayed. Both the beetles and the larvæ may be beaten from the plants into nets or into open pans containing water with a little coal oil on the top. Poultry of all kinds when available are useful in eating the beetles when they first appear in spring.

Potatoes in gardens were seriously attacked and very much reduced in yield by the Potato Leaf Aphis, *Nectarophora solanifolii*, Ashm. This was in the east of the province, and the injury was much aggravated by the exceptional drought. The Colorado Potato Beetle was noticeably less injurious than usual in the early part of the season, but it made up for any early absence by the excessive abundance in autumn.

**FRUIT CROPS.** The apple crop of the province for 1906 may be described as rather short in quantity, but of excellent quality in the eastern counties. In western Ontario, the ravages of the Codling Moth were severe, and throughout the province more injury was done by the Plum Curculio to apples than in any previous year of which we have statistics. This, to some measure, may have been due to the poor plum crop, which was a character of the season, and which is accounted for in various ways by differ-

ent writers. Probably the factor of most importance was cold, windy weather at the time of blooming. Sweet cherries were much reduced by winter killing of the buds, and by the falling of the fruit after setting. Sour cherries gave an excellent crop free from insect injury. Small fruits were abundant with the exception of strawberries, which were very much winter killed in the eastern end of the province.

The Codling Moth was more complained of than for many years, and where spraying was not resorted to the loss was great. In western Ontario, apple growers are now recognizing that they must both spray and band their trees to prevent loss, and moreover that this work must be persisted in and carefully done year after year. Banding the trees alone is useless, unless the cocoons of the caterpillars which have resorted to them for spinning up are removed or crushed at short intervals. The bands should be put on from the middle of July, and examined at least once a week until no fresh cocoons can be found. The irregularity of development in the Codling Moth makes it sometimes difficult for fruit growers to understand the true nature of this insect. In the eastern part of the province there is normally only one brood of this insect, whereas, in the west, there are two. There are, however, always a few individuals of each brood which behave in an exceptional manner. Of a large number of caterpillars of the Codling Moth collected at Ottawa in July, 1905, a few emerged the same summer, and would in a state of nature have given a second brood of larvae. By far the larger proportion of the brood, however, behaved in the normal way, and went over the winter as larvæ. Just at the time of spinning up, there were three or four days of excessively hot weather, which may have been the cause of some of the caterpillars producing moths the first summer. Several of the moths emerged at the proper time the next spring; but a small proportion of the larvæ are actually still unchanged in their cocoons at the present time, (December 1906), and as they are healthy they will probably emerge next year, thus showing that of the same brood some emerged as moths within a few weeks of the time of spinning up, while others treated in exactly the same way could remain in the cocoon for very nearly two years. In coming to a decision as to the number of normal broods of an insect, a matter of great importance in devising remedies, it is therefore necessary to take a general view of the facts, and not come to conclusions from exceptional variations in habit.

The Plum Curculio was exceedingly destructive to apples in many parts of Ontario and Quebec provinces during the past summer. Some apples sent from a locality near Toronto contained three or four grubs to each apple. The apples were seen to be falling to an unusual extent towards the end of June, and were sent for examination as to the cause of this dropping. The grubs of the Plum Curculio leave the apples during the month of July, and change to pupæ in the ground, the beetles emerging a few weeks later in August and September, and passing the winter as beetles. Good results, as far as the insect is concerned, have been secured by ploughing up sod in infested orchards at the end of July or early in August. If there were any anxiety as to stimulating too late a growth of the trees by the practice, it might be offset to a large measure by sowing the land at once to a cover crop to absorb soil moisture, the object of the ploughing being to break up the cells in which the delicate and soft pupæ are contained, so that many of them might be crushed or injured by the operation or might be exposed to their bird and insect enemies. The remedy in Canada which has given the best results against the Plum Curculio, and which is decidedly the most economical of those usually recommended, is the



spraying of the trees with the Poisoned Bordeaux mixture in the same way that apple trees are sprayed for the Codling Moth and fungous diseases.

The San Jose Scale. There has recently been a renewal of interest in the subject of the San Jose Scale, which has been a little more noticed than for a year or two in districts lying beyond the main centres of infestation. As a matter of fact there is very little news to be given concerning the occurrence of this most injurious insect in Canada. It is satisfactory, however, that more attention should be paid to it by fruit growers. The standard lime and sulphur wash is quite effective, and if used, as has been advised, year after year, will keep trees clean enough to bear good crops, and if persisted in as a regular annual treatment, not only this insect but many others as well as fungous diseases of various sorts will be gradually exterminated or prevented from injuring the crop to a marked extent.

The Apple Maggot, *Rhagoletis pomonella*, Walsh. In 1896 the Apple Maggot, also known as the Railroad Worm from the brown marks made through the flesh of the infested apples by the maggots, was first noticed as an injurious insect in Canada. This was in Lennox County. Since that time very little injury has been noticed in the orchards where it was first observed, but during the past summer there are reports of rather widespread infestation throughout the adjoining County of Prince Edward. The injury is serious, as it renders the fruit unfit for the market without showing any very apparent marks on the outside. The injury is caused by slender white maggots about  $\frac{1}{4}$  of an inch in length, which burrow in all directions through the flesh of the apple, feeding upon the pulp and leaving discoloured galleries. The white maggots are extremely difficult to see, but there may be several within a single fruit. The eggs are inserted beneath the skin of the apple by the females which are strikingly beautiful little black and white flies with banded bodies and golden eyes. These are about half the size of the ordinary housefly, and although they do not fly far are very active in their movements. There is only one brood in the year, but the flies emerge very irregularly and may appear at any time from midsummer until autumn. The young maggots become full grown in about six weeks, when they leave the apples and enter the soil for a short distance, where they turn to yellowish white smooth puparia. Apples which are infested for the most part fall to the ground, and the maggots remain in the fallen apples for a short time after they have fallen. Maggots from late laid eggs are often inside the fruit when it is picked. Consequently apples, which are apparently quite good at the time of packing, may in a short time become perfectly useless. All varieties of apples are liable to attack, but some much more so than others. As a general statement, early and sweet apples are most infested. It is possible that this serious enemy of the fruit grower may before long be one of the enemies which will require to be reckoned with every season. For many years it has been the cause of much loss in Vermont, Maine, and in parts of New York State. There have also recently been some rather serious outbreaks in Canada, in the provinces of Quebec and New Brunswick. It is satisfactory to know that the injury, even in the worst infested localities, fluctuates very considerably in intensity. The only practical remedy so far known is to destroy all infested fruit as soon as that fact is discernible. Windfalls should be gathered up carefully, and at short intervals during the summer, and should at once be fed to stock or destroyed in some other way. What is thought to be the most economical and effective way of doing this is to allow growing pigs to run in the orchard from July, when early apples which are particularly liable to attack begin to fall, and the animals should be kept in the orchard until all fruit is gathered. Sheep will eat apples if there is not too much grass on the

ground, but they are less useful for this purpose than pigs. Chickens and other poultry are likewise of service. The ground under apple trees in districts where the Apple Maggot is known to occur should be cultivated regularly. If no stock is available to which fallen fruit can be fed, it should be buried in a deep hole, and then covered up with two or three feet of earth. As the egg of the apple maggot is inserted into the flesh of the apple by the females with their sharp ovipositors, there is no spraying mixture which can be used against this insect.

**FLOWERS.** In flower gardens, one of the striking outbreaks of the year has been the abundance in many parts of Canada of the minute Moth-flies, or White Flies. Such specimens of these as have been examined seem to be the Greenhouse White Fly, *Aleyrodes vaporariorum*, and it is possible that they may have been introduced into gardens with fuchsias and other plants propagated in greenhouses, and owing to some climatic condition have this year increased out of doors to a much larger extent than is usual. Although extremely small, these minute fly-like sucking insects are very destructive. The larval and nymph forms bear a somewhat close resemblance to their near relatives the scale insects. Plants which were badly infested at Ottawa were cucumbers, tropæolums, fuchsias and lilac bushes, but many other kinds were also more or less attacked. White Flies are difficult to control, but may be kept in check by the constant spraying of infested plants with whale oil soap solution, or a diluted kerosene emulsion. In greenhouses probably fumigating with hydrocyanic acid gas is the best remedy. ,

**SHADE TREES.** Ornamental shrubs and shade trees were severely attacked early in the season over a large part of the province by enormous numbers of plant lice, of many species. Trees particularly infested were soft maples by a species of Woolly Aphis, which was found in large clusters beneath the leaves of the Silver Maple, *Acer dasycarpum*, and its numerous varieties. Another new attack of the Silver Maple of more than usual interest was the wholesale destruction of the seeds by the larvæ of the Nitidulid beetle *Epuræa rufa*. The seed was produced in large quantities this year, and was ripe by the middle of June. Towards the end of the month some sacks of the seed were collected for sowing. They had lain on the ground for a few days; but were apparently in good condition. During July, however, it was found that nearly every seed was infested by slender, dirty-white grubs about  $\frac{1}{4}$  inch long, with a testaceous roughened dorsal patch across the middle of each segment. Every seed contained from 12 to 18 of these grubs, which had reduced the contents of the seed to a green meal-like powder. When fully-fed, the grubs left the seeds and pupated near the surface of the ground. In August, large numbers of the beetles emerged. In the soil were also found many of the small cocoons of a parasite which has not yet emerged. The beetles of the family to which *Epuræa rufa* belongs are for the most part scavengers in habit, living upon dead and decaying animal and vegetable substances, but in this instance sound seeds were attacked, and the species can evidently be a destructive enemy to one of our favourite shade trees.

Birches of all kinds were covered from top to bottom with myriads of plant lice, so that by the middle of July the leaves began to fall noticeably. Early in July the abundance of Lady-bird beetles was noticed, particularly of the common Two-spotted Lady-bird *Adalia bipunctata*, and by the end of the month these had increased so much that the infested birch trees were almost cleared and the leaves took on a strange dirty appearance from the enormous numbers of the pupæ of the *Adalia*, as many as 18 to 20 being found in many instances on a single leaf. The good work done by



these insects in clearing the trees of their enemies was, however, only rewarded by these themselves proving a prey to another of nature's factors in preserving the balance of life. A very small percentage of these pupæ gave forth the beetles; instead, most of the pupæ produced a swarm of minute hymenopterous parasites.

Elm trees were badly attacked by the Woolly Elm-leaf Aphis, which, during the month of June, curled up the leaves of the elms used as shade trees, and made sidewalks and seats, or even walking beneath the trees, most unpleasant, owing to the showers of honey-dew which constantly fell from the clusters of plant lice. The Elm Soft-scale, *Lecanium canadense*, was also abundant and destructive in many places. The White Cedar or American Arbor-vitæ was seriously disfigured by the attacks of two minute moths, *Argyresthia thuella*, Packard, and in far less numbers *Recurvaria thujaella*, Kearf. The injuries to these trees were so severe throughout the Ottawa district, both on private grounds and in the woods, as to give a rusty sickly appearance to all of the white cedars by reason of the large number of tips of young twigs which had been killed by the caterpillars boring inside them in autumn and again in the following spring after reviving. The minute caterpillars lived singly in a small twig, and each one was able to destroy a surprisingly large amount of green growth. The beautiful little moths, silvery white with brown markings, were found flying in clouds around the trees during the latter half of June.

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## ENTOMOLOGICAL RECORD, 1906.

BY DR. JAMES FLETCHER, DOMINION ENTOMOLOGIST, AND ARTHUR GIBSON,  
OTTAWA.

Judging from reports which have come to hand in connection with the Entomological Record, there has apparently been rather less enthusiasm than heretofore among collectors of insects in Canada during the past season. The personality and energy of Mr. R. V. Harvey, of Vancouver, have been effective in stirring up an unusual interest in all orders of insects in our Pacific province; and, as Secretary of the British Columbia Entomological Society, he has issued three most interesting quarterly bulletins, in which are valuable records of captures and items of entomological news, which will be useful for reference by all who take up the study of British Columbian insects. We trust that these bulletins will be continued regularly, and that all the members of the Society will see the advantage of promptly and regularly communicating to the secretary items bearing upon the provincial insect fauna.

Reports as to the nature of the season in 1906 were of a very diverse nature and were evidently much affected by local conditions. As an instance of this, the writers found sugaring for moths remarkably unremunerative at the Experimental Farm, Ottawa, while two other collectors, Mr. J. W. Baldwin, at Britannia Bay, about six miles west, and Mr. C. H. Young, at Meach Lake, fifteen miles north, noted the abundance of night flying moths at sugar. The suggested local cause affecting the question at the Experimental Farm, was that there was a remarkable outbreak of aphides on almost all kinds of trees and shrubs in the early part of the season, by which all foliage was thickly coated with honey dew, which proved more attractive to the moths than the treacle put on the trees. However, as is always the case, steady collecting was rewarded with many treasures.

Mr. J. D. Evans, at Trenton, was remarkably successful in collecting microlepidoptera in a lantern trap made as described by Mr. W. D. Kearfott.

A large number of notes of captures have been received from various parts of the Dominion, but some of the writers do not quite seem to understand what the scope of this record is, from the point of view of the present compilers. Large and complete lists of insects taken in a given locality are not desired; but merely notes on such as are of rare occurrence there, or concerning which specialists may have given interesting information in their letters. The capture of an insect beyond its recorded range or at an unusual season are records of value.

We beg gratefully to acknowledge the greater care which has been shown by several correspondents in giving exact data when these were procurable, and we would now point out that it would help materially in the preparation of Notes of Captures if correspondents, when sending in records, would put opposite each record, the number of the insect in the recognized check list of the order. This has been done by a few and is of very great assistance in making up the Record.

As in the past, we have again to express the great obligation Canadian collectors are under to the leading specialists in many orders of insects. Particular mention must be made of Dr. L. O. Howard, Dr. H. G. Dyar, and Mr. D. W. Coquillett, of Washington; Dr. J. B. Smith, of New Brunswick, N.J.; Dr. H. Skinner, of Philadelphia; Mr. W. D. Kearfott, of Montclair, N.J.; Prof. Wickham, of Iowa City; Prof. Hine, of Columbus, O., and Mr. E. P. Van Duzee, of Buffalo. All of these gentlemen have contributed largely to the exact identification of our Canadian captures during the past year. We again point out the wisdom of the greatest liberality in providing these specialists with any specimens they may desire from Canada. It is only after many years of study and collecting that they have reached the positions they now hold, of being able in a short time to name the specimens submitted to them. If at any time it is indicated that specimens would be acceptable, every effort should be put forth to discharge, in part at least and as soon as possible, the heavy debt of gratitude under which so many of us lie for past favours in the identification of material which, but for the assistance so freely given, would be comparatively useless.

During 1906 there have been a few expeditions made in Canada for the purpose of collecting insects; meagre records only of these have been received, either as to the special objects for which they were made, or as to the material collected. The officers of the Geological Survey of Canada, who in the past have collected many scarce insects from the little known regions visited by them in connection with their official work, during the past year, for one reason or another did not bring back many insects. The only collection made was a small one by Mr. L. M. Lambe in British Columbia. This is to be regretted, although the difficulties of collecting and preserving such fragile specimens as insects are well understood, and of course such collections are beyond the limits of the regular work for which most of the officers of the Geological and Natural History Survey Department go to the field. Mr. Theodore Bryant made a valuable collection of lepidoptera when engaged with the International Boundary Survey of the Alaska Coast strip. His work took him along the Taku River and the Tallsaykway, a tributary of the Taku. Messrs. George White Fraser and Robert Smith of the same survey also made a small but interesting collection chiefly Coleoptera and Hymenoptera in the Skagway District of Northern British Columbia. Messrs. R. V. Harvey and R. S. Sherman, of Vancouver, made an interesting collecting trip over the Hope Mountains from Fort Hope on the Fraser River, to Princeton on the Similkameen, a distance of 65



miles, between July 10 and 28. Many interesting lepidoptera and diptera as well as insects in other orders were collected. An account of this expedition is given in the Quarterly Bulletin of the British Columbia Entomological Society for September, 1906. Dr. Harrison G. Dyar again visited British Columbia this year, but his chief work was done with relation to mosquitoes and their habits. Mr. E. B. Williamson, of Bluffton, Ind., collected in Northern Ontario between July 29 and August 6 and secured a large amount of material. The syrphid flies (14 species) are now in the hands of Prof. R. C. Osburn, of Columbia University; and the Odonata are being worked up by Mr. Williamson and Dr. E. M. Walker. Mr. C. H. Young, of Ottawa, spent the summer at Meach Lake, Que., in the Laurentian Mountains, where he collected assiduously and reared many specimens from larvæ. He was particularly successful in collecting microlepidoptera, and set up in his characteristically exquisite manner over 1,500 specimens, all of which may be described as perfect. Mr. G. A. Moore, of Montreal, made a large collection of hemiptera at Como, Que., a complete list of which will appear at an early date in the *Canadian Entomologist*. In the present record, notes will be found of a few other insects taken by Mr. Moore at the same time. The Montreal collectors have had regular meetings and excursions, and, in addition to the work of the Montreal Branch of the Entomological Society of Ontario, the recently organized Mount Royal Entomological Club has done good work and has published a small pamphlet, Nos. 1 and 2, of proceedings. The Ottawa entomologists have continued to work energetically in connection with the Ottawa Field-Naturalists' Club, making many expeditions. A record of their work will be found in the *Ottawa Naturalist*, which is published regularly by that club. Messrs. T. D. Jaryis and E. J. Zavitz, working with the Rev. Prof. Bethune at the Ontario Agricultural College, have created much interest in entomology among the students. Mr. Jarvis has specialized on galls and gall insects and has accumulated a large collection. Mr. Zavitz has directed his attention chiefly to forest insects, and both will be pleased to hear from correspondents in all parts of Canada concerning these important branches of entomology. In Nova Scotia excellent work has been done by Mr. John Russell, of Digby, N.S., who has added many species to those already recorded from the Maritime Provinces. Mr. Joseph Perrin, of Halifax, has also added to his previous laurels by collecting many rare species. Among those whose names are well known for the work they have done in connection with Canadian entomology, vigorous work has been continued during the past season in their various localities, by the Rev. G. W. Taylor, of Wellington, B.C., who continues his studies of the geometridæ, and who, although absent for the greater part of the summer on the Dominion Fishery Commission, has found time to name many collections which have been sent to him for identification. Mr. J. W. Cockle at Kaslo has added largely to his collection of Kootenai insects, and Mr. A. H. Bush, of Vancouver, has collected throughout the season and added several new names to the local list. In the foothills of the Rockies, Messrs. Thomas Baird, of High River, F. H. Wolley-Dod and F. A. Hudson, of Millarville, have done good work in unravelling difficulties connected with their interesting western fauna. In the Okanagan Valley Mr. E. P. Venables has made useful observations, in the prosecution of which he is now aided by his friend Mr. E. S. Wilmot, who has already taken some rare species, not previously recorded from the district. Mr. T. N. Willing has collected energetically in many parts of Saskatchewan and has accumulated much material in all orders. These are being worked up and will form a nucleus for a reference museum in connection with the Provincial Department of Agriculture, which will be of inestimable value

to farmers and others. In Manitoba Messrs. Criddle, Heath and Marmont have continued their work enthusiastically and have added very much to our knowledge of the insects of that province.

#### LITERATURE.

Among the many valuable works, reports and separate papers of interest to Canadian students of insects, which have been received during the past year, special mention may be made of the following:—

CARY, Merritt. The Diurnal Lepidoptera of the Athabasca and McKenzie Region. (Proc. U. S. N. M., Vol. XXXI, pp. 425-457). This paper will be of special value to our western members. It gives as complete a list as can as yet be compiled. The facts are taken from published lists and also from the collections of the author while making a biological exploration in the north during the summer of 1903, and of Mr. E. A. Preble in 1903 and 1904. Other species will doubtless be added to this list, but it is an excellent starting point for future work. Great care has evidently been taken to give full credit to all who have done anything, however little, in working up the diurnals of this little known region.

CASEY, Thos. L. Observations on the Staphylinid Groups, *Aleocharinæ* and *Xantholinini*, chiefly of America. (Trans. Academy of Sciences of St. Louis, pp. 125 to 434.) Coleopterists will note with great pleasure that Major Casey is again at work in the Staphylinidæ, a group of insects in which he has done such magnificent work. The present monograph covering particularly the two extremely difficult sub-families mentioned, will give a stimulus to North American collectors who have required just such a revision as is now provided to work up their material.

FELT, E. P. Insects Affecting Park and Woodland Trees. (Memoir VIII, N. Y. State Museum; 4to, Albany, 1905, pp. 332, plates 48, 20 coloured.) This sumptuous volume is printed on the best of paper, and everything is carried out as well as can be done by skilful printers and binders, a fit setting for the care and skill devoted to its preparation by Dr. Felt and his assistants. It brings together the results of many years' work and is supplementary to Dr. Packard's Forest and Shade-tree Insects. The letterpress is well prepared so as to be of the greatest use to the large number who will consult this work, but who are not trained entomologists. The entomologist, however, will also find that much care has been exercised in the identification of all species mentioned and in working up accurately the life-histories presented. The plates are of unusual beauty; Dr. Felt seems to have the same ideal as actuated Sir Edwin Landseer, who never portrayed in his pictures any animal that was not a thoroughbred or which was not in the best of condition. Dr. Felt's insects, even when reproduced by photography, are not only perfect, but have been set and prepared for reproduction with the greatest care. Some of the plates illustrating moths are probably unsurpassable in this respect.

FERNALD, Henry T. The Digger Wasps of North America and the West Indies belonging to the sub-family Chloroninæ. (Proc. U. S. N. M., Vol. XXXI, pp. 291-423, 5 plates.) Dr. Fernald has brought a well-trained mind to bear upon the difficult task which he set himself and has done his work in such a way as to deserve the thanks of all hymenopterists. All the extensive collections in the United States have been examined, and all types so far as known have been studied. It is to be hoped that more students will devote themselves to these interesting insects now that this further help has been added to existing literature.



FOLSOM, J. W. Entomology with Special Reference to its Biological and Economic Aspects. (P. Blakiston's Son & Co., Philadelphia, 485 pp., with five plates (one coloured) and 300 text figures, \$3.00.) The number of works in the entomologist's working library is already very large, but few active workers will be able to do without Dr. Folsom's recently issued magnificent work. In Packard's Guide, Comstock's Manual, and Kellogg's American Insects, classification is the prevailing idea, and is most useful and necessary; but in the present work the main object has been to supply in a concise form biological data. Familiar insects are used and the work is copiously illustrated with figures of the highest class. A short chapter on Classification, consisting of only 26 pages, begins the work. This, it may be thought, might have been extended to possibly twice its length with advantage. Chapter 2 on Anatomy and Physiology treats the subject in a delightful and fascinating manner. The same may be said of the next chapter on Development, in which typical insects only are dealt with in a suggestive manner. The titles of the remaining chapters are well chosen and the subjects effectively treated. They will be read with the greatest pleasure by all. Adaptations of aquatic insects, Colour and Coloration, Insects in relation to plants and to other animals, The Inter-relations of Insects, and Insects in relation to man, are subjects well dealt with in a concise and plain way, which can be understood by students. We believe that this work will do much to render the science of entomology much more popular than it must be acknowledged it has been in the past among students of agricultural colleges and others, notwithstanding the enormous economic importance of the subject, as shown by the annual losses in staple crops.

PACKARD, A. S. Monograph of the Bombycine Moths of North America, Part II, Ceratocampidæ. (Memoir IX, National Academy of Sciences, Washington, D.C., 1905, 4to, pp. 149, 61 plates, 24 coloured.) This is a most valuable work, giving full life-histories of the Ceratocampid moths of North America. The subject is treated of in Dr. Packard's masterly manner, and the plates, which are most beautiful, have been drawn by Messrs. J. Bridgham and L. H. Joutel, or are reproduced from photographs by Mr. A. H. Verrill. In looking through this work, we are sadly reminded that Dr. Packard's death removes one whose name has been such a watch-word for good work in American entomology and takes a shining light from the ranks of the leading American scientific men who have done so much to uphold the standard of scientific excellence on this continent. The coloured illustrations, which are chromolithographs by A. Hoen & Co., of Baltimore, are simply exquisite, and the whole work supplies one of the most beautiful additions to the literature of the Lepidoptera of North America which has ever appeared. It is to be hoped that the National Academy may authorize Dr. Harrison G. Dyar or some of the many other accomplished lepidopterists of the United States to give to the public similar Memoirs upon other North American moths.

SMITH, J. B. Explanations of the Terms used in Entomology. (Published by the Brooklyn Entomological Society, Brooklyn, N.Y., price \$2.00.) This most useful work, which perhaps answers more exactly to the trite expression that "it fills a long-felt want" than any recent publication, will provide many entomologists with a handy book of reference, which will enable them to understand the many useful, but in many instances unnecessary, unfamiliar terms which they frequently find in reading books dealing with the study of insects. This volume contains over 150 pages and explains between four and five thousand terms of more or less frequent use. One cannot read a page without feeling that many words have been made

use of by writers without any special need, and in some instances with the result of bewildering the reader without any compensating advantage. Four plates at the end of the work show structural details of the external body wall of some typical insects and the best known colours. As plates were given at all, it seems almost a pity that one or two more were not added, particularly one showing the markings and venation of the noctuidæ and some other orders in which Dr. Smith is the recognized authority. This handy little glossary will be found indispensable to all college students and other extensive readers of entomological literature.

The following is a list of the names and addresses of collectors heard from during 1906:—

- Anderson, E. M., Prov. Museum, Victoria, B.C.  
Baird, Thomas, High River, Alta.  
Baker, Arthur, Harding Hall College, London, Ont.  
Baldwin, J. W., 74 Besserer Street, Ottawa, Ont.  
Bethune, Rev. Prof., O. A. C., Guelph, Ont.  
Bryant, Theo., 2044 3rd Ave. W., Vancouver, B.C.  
Bush, A. H., 1105 Ninth Ave., Vancouver, B.C.  
Chagnon, Gus., Box 186, Montreal, Que.  
Cockle, J. W., Kaslo, B.C.  
Cosens, A., Jamieson Ave., Coll. Inst., Toronto, Ont.  
Criddle, Norman, Treesbank, Man.  
Denny, Edward, 200 Mitcheson St., Montreal.  
Dod, F. H. Wolley-, Millarville, Alta.  
Draper, R., Mt. Pleasant, Vancouver, B.C.  
Evans, J. D., Trenton, Ont.  
Fyles, Rev. T. W., Levis, Que.  
Garrett, C., Calgary, Alta.  
Gibbon, Hugh, Miniota, Man.  
Grant, C. E., Orillia, Ont.  
Hahn, Paul, Roxborough Ave., Toronto.  
Halkett, A., Fisheries Museum, Ottawa.  
Hanham, A. W., Duncans, B.C.  
Harrington, W. H., P. O. Dept., Ottawa.  
Harvey, R. V., Queen's School, Vancouver, B.C.  
Heath, E. F., Cartwright, Man.  
Hudson, A. F., Millarville, Alta.  
Jarvis, T. D., O. A. C., Guelph, Ont.  
Jones, W. A. Dashwood-, New Westminster, B. C.  
Keele, Jos., Geological Survey, Ottawa.  
Keen, Rev. J. H., Metlakatlah, B.C.  
Lambe, L. M., Geological Survey, Ottawa.  
Lyman, H. H., 74 McTavish St., Montreal.  
McIntosh, W., Nat. His. Soc'y., St. John, N.B.  
Marmont, L. E., Rounthwaite, Man.  
Metcalf, W., 288 Bank Street, Ottawa.  
Mitchell, Arch., Dep. of Agriculture, Edmonton, Alta.  
Moore, W. H., Scotch Lake, N.B.  
Moore, G. A., 209 Prince Arthur St., Montreal.  
Perrin, Jos., McNab's Island, Halifax, N.S.  
Russell, John, Digby, N.S.  
Sansou, N. B., Banff, Alta.  
Saunders, Henry, 21 Harbord St., Toronto.  
Sherman, R. S., 2285 Sixth Ave., Vancouver, B.C.



Simpson, Willibert, Dom. Observatory, Ottawa.  
 Stevenson, Chas., 906 St. Urbain St., Montreal.  
 Taylor, Rev. G. W., Wellington, B.C.  
 Venables, E. P., Vernon, B.C.  
 Walker, Dr. E. M., 99 St. George St., Toronto.  
 Wallis, J. B., Office of Sup. Schools, Winnipeg, Man.  
 Williams, J. B., 236 Bloor St. E., Toronto, Ont.  
 Willing, T. N., Regina, Sask.  
 Wilmot, E. S., Vernon, B.C.  
 Wilson, W. J., Geological Survey, Ottawa.  
 Winn, A. F., 132 Springfield Ave., Westmount, Que.  
 Young, C. H., Hurdman's Bridge, Ont.  
 Zavitz, E. J., O. A. C., Guelph, Ont.

## NOTES OF CAPTURES.

### LEPIDOPTERA.

(Arranged according to Dyar's List of North American Lepidoptera, U. S. N. M. Bull. No. 52.)

#### RHOPALOCERA.

(Dyar's number.)

51. *Callidryas philea*, L. St. John, N.B., Sep. 17, perfect specimen taken on dahlia blossoms, (McIntosh). This is the first Canadian record of this southern insect.
70. *Eurymus alexandra*, Edw., b. *emilia*, Edw. Kaslo, B. C., male and female seen but not captured, Aug. 19, (Cockle); Kalso, July 22, 1897, (Danby).
92. *Euptoieta claudia*, Cramer. Westmount, Que., one specimen seen Sept. 8, (Winn).
207. *Polygonia satyrus*, Edw. St. John, (McIntosh). The form *marsyas* was taken at Digby, N.S., by Mr. J. Russell.
223. *Junonia cœnia*, Hbn. Orillia, Ont., second specimen taken here, July, (Grant).
264. *Cercyonis ætus*, Bdv. Tranquille, B. C., July 7, (Lambe).
374. *Incisalia irus*, Godt, var. *arsace*, Bdl-Lec. Digby, N. S., 4 sps., May 5 to 22, (Russell).
383. *Erora læta*, Edw. Digby, June 7, (Russell).
463. *Amblyscirtes samoset*, Scudd. MacNab's Island, Halifax, N.S., quite abundant, (Perrin).

#### HETEROCERA.

661. *Lepisesia juanita*, Strk. A male in perfect condition, hovering over a thistle head in hot sunshine near Red Deer River, about 50 miles north-east of Gleichen, on July 6, 1905; agrees with Strecker's description, and is apparently the first record for Canada, (Dod).
674. *Arges labruscæ*, L. St. John, Aug. 25, at light, (McIntosh). This is the only known Canadian record of this magnificent southern hawk moth.
704. *Sphinx luscitiosa*, Clem. Digby, N.S., July 15, 16, (Russell); Aweme, Man., May 27, June 10, 17, (Criddle). Montreal, July 17, (Can Ent. 38, p. 59).

778. *Basilona imperialis*, Drury. Ross Mount, Ont. Two perfect specimens, male and female, of this handsome moth, which is rare in Canada, were recently taken at the above place by Mr. T. W. Ramm, and presented to the Division of Entomology.
846. *Ecpantheria deflorata*, Fab. Niagara Glen, Ont., two larvæ, Sept. 18 and 20, one found feeding on violets, (Williams).
859. *Isia isabella*, S. & A. Kaslo, July 16, 2nd specimen taken by me here, the 1st in 1891, (Cockle).
875. *Apantesis virguncula*, Kirby. Milton, N.S. July 6, (W. H. Moore).
880. *Apantesis anna*, Grt. Niagara Glen, (Hahn).
961. *Demas propinquinelinea*, Grt. MacNab's Island, Halifax, Feb. 11, (Perrin).
964. *Charadra deridens*, Gn. This handsome noctuid has this year been reported from several localities: Cartwright, Man., June 15, (Heath); Ottawa, June 22, (Young); June 4, (Fletcher); Digby, June 23, (Russell).
- 1,006. *Apatela tritona*, Hbn. MacNab's Island, Halifax, July 2, (Perrin).
- 1,008. *Apatela funeralis*, Grt. St. John's, Que., July 1, (Chagnon); Ottawa, (Young, Fletcher); Toronto, (Gibson).
- 1,149. *Hadena bridghami*, G. & R. Digby, Aug. 22, (Russell). St. John Aug. 20, (McIntosh).
- 1,153. *Hadena claudens*, Wlk. Kaslo, Aug. 28, (Cockle); Aweme, Man., Aug. 24, (Criddle & Fletcher).
- Hadena ferens*, Sm. Calgary, Alta., at light, July, 12, (Hudson).
- 1,189. *Hadena barnesii*, Sm. Kaslo. July 28, (Cockle).
- 1,212. *Hadena passer*, Gn. Digby, July 9, (Russell); Kaslo, July 21, (Cockle).
- Hadena rorulenta*, Sm. MacNab's Island, Halifax, July 5, (Perrin); Ottawa, June 23, (Young); Digby, June 29, (Russell).
- 1,228. *Hadena plutonia*, Grt. Meach Lake, July 17, (Young). First record for the Ottawa district.
- 1,230. *Hadena ducta*, Grt. Massett, Q. C. I., July 9, (Keen).
- 1,298. *Heliotropha obtusa*, Sm. Aweme, Aug. 19, (Criddle). Described from New Hampshire; never saw it since, (J. B. Sm.).
- 1,312. *Homohadena badistriga*, Grt., var. *fifa*, Dyar. Kaslo, July 3, (Cockle).
- 1,345. *Oncocnemis glennyi*, Grt. Vernon, (Bush).
- 1,356. *Oncocnemis barnesii*, Sm. Kaslo, Aug. 19, (Cockle). The third known specimen.
- 1,359. *Oncocnemis balteata*, Sm. Aweme, Aug. 11, 22; Sep. 1, (Criddle). A rare and beautiful species.
- 1,390. *Rhynchagrotis rufpectus*, Morr. Ottawa, Aug. 9, (Young).
- 1,429. *Semiophora youngii*, Sm. Digby, N.S., Aug. 28, (Russell).
- 1,477. *Noctua esurialis*, Grt. Vancouver, B.C., July 20, (Bush).
- 1,480. *Noctua conchis*, Grt. Regina, Sask., July 11, (Willing).
- 1,484. *Noctua phyllophora*, Grt. Ottawa, June 22, (Fletcher); Digby, July 7, Aug. 3 (Russell); MacNab's Island, Halifax, July 15, 20, (Perrin).
- 1,492. *Noctua juncta*, Grt. Millarville, Alta., July 17, (Hudson).
- 1,560. *Pronoctua typica*, Sm. Kaslo, Sept. 9, (Cockle).
- 1,530. *Rhizagrotis albicosta*, Sm. High River, (Baird).
- 1,531. *Rhizagrotis flavicollis*, Sm. High River, Alta., (Baird).



- 1,533. *Rhizagrotis lagena*, Grt. A pair on Red Deer River, July 1 and 3, at snowberry flowers at dusk, (Dod & Hudson).  
*Paragrotis maimes*, Sm. Calgary, common at light in early August; scarce for years past, (Dod & Hudson); High River, (Baird).  
*Paragrotis vestitura*, Sm. Can. Ent. XXXVII., p. 20. St. John, usually rather abundant in August. It was from my specimens that Dr. Smith described the species, (McIntosh). McNab's Island, Halifax, Aug. 12, (Perrin).
- 1,579. *Paragrotis plagigera*, Morr. Spatsum, B.C., July 26, (Bush).
- 1,611. *Paragrotis acornis*, Sm. Calgary, Sep. 19, one at light, (Dod); High River, (Baird).
- 1,623. *Paragrotis detersa*, Wlk. The white larvæ almost identical in appearance with those of *Paragrotis scandens* were common around clumps of *Salsola Kali* and *Cakile Americana* on the sandy beach at Youghall, N.B., in July, (Fletcher).
- 1,697. *Paragrotis dissona*, Moschler. Banff, Aug. 10, (Sanson); Field, B. C., July 24, (Bush).
- 1,721. *Paragrotis furtivus*, Sm. Vancouver, July 11, (Bush); High River, (Baird).
- 1,731. *Paragrotis acutifrons*, Sm. Cartwright, July 17, one at sugar, (Heath).
- 1,732. *Paragrotis nordica*, Sm. Cartwright, July 11 and 17, at sugar, (Heath).
- 1,785. *Mamestra distincta*, Hbn. Meach Lake, Que., May 16, (Young).
- 1,788. *Mamestra liquida*, Grt. Kaslo, June 27, (Cockle).
- 1,804. *Mamestra larissa*, Sm. Aweme, June 3, (Criddle). *Teste* Dod.
- 1,806. *Mamestra rubefacta*, Morr. Digby, June 18, (Russell).
- 1,808. *Mamestra cristifera*, Wlk. Meach Lake, July 10, (Young).
- 1,809. *Mamestra assimilis*, Morr. Ottawa. Four mature larvæ found feeding on common St. John's-wort, *Hypericum perforatum*, Sept. 22, 1905. Emerged June 7, 1906, (Gibson).
- 1,851. *Mamestra penilis*, Grt. Aweme, July 6 and 26, (Criddle). *Teste* Dod.  
*Mamestra obesula*, Sm. Calgary, a few at light, July 12 to 25, (Dod & Hudson); Rosthern, Sask., July 21, (Willing).
- 1,882. *Barathra curialis*, Sm. This interesting species, which was so abundant in Canada during 1905, and which was mentioned in last year's Entomological Record, under the name *Barathra occidentata*, Grt., has again appeared in small numbers in some localities. Mr. Lyman and Mr. Winn report having taken it at Montreal in June; and Mr. Perrin, of MacNab's Island, Halifax, captured it on June 25, 27, and July 4.
- 1,906. *Scotogramma submarina*, Grt. About 8 specimens at snowberry flowers, at dusk, on Red River, July 1-4, (Dod & Hudson).
- 1,910. *Scotogramma uniformis*, Sm. Field, July 25, (Bush); Banff, July 16, (Sanson).
- 1,918. *Scotogramma conjugata*, Sm. Vancouver, taken from a railway car, July 7, (Bush).
- 1,941. *Anarta zetterstedti*, Staud. Field, B.C., July 25, (Bush).
- 1,965. *Heliophila diffusa*, Wlk. Aweme, June 17, (Criddle). *Teste* Dod.
- 2,000. *Orthodes irrorata*, Sm. Vancouver, June 29, July 16, (Bush).
- 2,042. *Graphiphora rubescens*, Wlk. Ottawa, April 23, 25, (Young).  
*Fishia exhilarata*, Sm. Kaslo, Oct. 10, (Cockle).

- 2,077. *Lithomoia germana*, Morr. Kaslo, Aug. 25; a new record for the interior of British Columbia, (Cockle).
- 2,086. *Xylina hemina*, Grt. Aweme, Apl. 23, and Sept., (Criddle). *Teste* Dod.
- 2,096. *Xylina amanda*, Sm. Aweme, Sept. 19, Oct. 1, (Criddle). *Teste* Dod; Miniota, Man., (Gibbon).
- 2,107. *Xylina tepida*, Grt. MacNab's Island, Halifax, Apl. 17, (Perrin); St. John, (McIntosh).
- 2,113. *Xylina capax*, G. & R. Cartwright, (Heath). *Teste* Dyar.  
*Xylina fletcheri*, Sm. Meach Lake, Sept. 6, 7, (Young).
- 2,168. *Gortyna medialis*, Sm. Calgary, a worn male at light, Sep. 19, very rare of recent years, (Dod).  
*Gortyna pallescens*, Sm. Kalso, Aug. 25, the only specimen taken since 1892, (Cockle). It is possible that Mr. Dod's specimen should be referred here.
- 2,175. *Papaipema harrisii*, Grt. var. Reared in some numbers from larvæ boring in the base of fronds of *Pteris aquilina*, Meach Lake, Aug., (Young). These larvæ were much parasitised.
- 2,191. *Papaipema appassionata*, Harvey. Reared from the roots of *Sarracenia purpurea*, Meach Lake, Aug., (Young). Many larvæ parasitised by *Masicera myoidea*. This most beautiful species is still very rare in collections.
- 2,213. *Tapinostola orientalis*, Grt. Calgary, two specimens at light, Sept. 8, (Hudson).
- 2,284. *Tapinostola variana*, Morr. Meach Lake, one specimen, July 7, (Young). A new record for Ottawa district.
- 2,473. *Polychrysia formosa*, Grt. MacNab's Island. Halifax, Aug. 17, (Perrin); St. John, July 19, (McIntosh).
- 2,516. *Autographa surena*, Grt. Quebec, Que., Aug. 12, 1902, (Hahn).
- 2,501. *Autographa alias*, Ottol. Dr. Ottolengui writes, "this species is found in nearly all collections under the name of *u-aureum*, a European species, the description of which does not fit anything in this country." Specimens have been received from St. John, (McIntosh); Halifax, (Perrin), and Ottawa, (Young).
- 2,503. *Autographa altera*, Ottol. McNab's Island, Halifax, (Perrin). Dr. Ottolengui writes: "The type of *altera* came from Nepigon, and I have a second specimen from the Adirondacks. Mr. Perrin's is the third. I am much interested in this specimen, because, being grayer than mine, it looks more like *variana*, but, placed between the types of these two species, which Dr. Dyar thought would prove to be the same, the specimen only emphasizes the fact, that both are species.
- 2,514. *Autographa celsa*, Hy. Edw. Vancouver, July 29, (Bush).
- 2,522. *Autographa excelsa*, Ottol. Sable Island, Aug. 19, 1899, (John Macoun). "I have been told that this species is not separable from *angulidens*, described from Colorado; but I have had over a hundred specimens of that before me, and every one has the silver mark with prolongations close together, and turned inwardly forming a U. I took my first *excelsa* in New Hampshire, and received others from Wolley-Dod, of Calgary. All that do not come from Colorado, have thus far had the typical V instead of the U silver mark. The genitalia also differ. You may feel safe in calling anything like this from Colorado, *angulidens*, as it seems as local as *vaccinii*. All others are *excelsa*." (R. Ottolengui.)



- 2,781. *Syneda graphica*, Hbn. Hope Mts., B.C., July 17, (Harvey).
- 2,872. *Catocala cerogama*, Gn. Cartwright, Aug. 18 and 20, one each night; this is, I think, a record for Manitoba. (Heath).
- 2,886. *Catocala cælebs*, Grt. Digby, Aug. 14, (Russell).
- 2,990. *Homoptera minerea*, Gn. White River, Hudson Bay slope, June 2, (W. J. Wilson).
- 3,007. *Thysania zenobia*, Cram. Toronto, Sep. 19, (Hahn). This is the second record of this magnificent visitor from the South being taken in Canada.
- 3,150. *Schizura semirufescens*, Wlk. Vancouver, taken from railway car, July 28, (Bush); Cartwright, June 17, (Heath).
- 3,169. *Gluphisia lintneri*, Grt. Calgary, a male flying in sunshine, Apl. 19, (Hudson); Aweme, Apl. 18, 25, (Criddle); Ottawa, var. *arimacula*, Huds., May 23, (Young).
- 3,197. *Euproctis chrysorrhæa*, L. St. John, N.B., July 22, 1904, (A. Gordon Leavitt). The second Canadian record.
210. *Tolyte distincta*, French. Kaslo, Aug. 17, (Cockle).
225. *Eudeilinea herminiata*, Gn. One on July 5, on Red Deer River, (Dod).
- 3,233. *Cystropteryx viridata*, Pack. Meach Lake, May 17, (Young).
- 3,259. *Carsia paludata*, Thunb. Hope Summit, 5,800 feet, July 19, (Harvey).
- 3,287. *Eupithecia latipennis*, Hulst. Meach Lake, June 15, (Young).
- 3,276. *Eupithecia ornata*, Hulst. Ottawa, Apl. 24, May 4, (Young).
- Eupithecia youngata*, Taylor. Ottawa, June 7, July 20, (Young). This species was described in the "Ottawa Naturalist" for March, 1906.
- Eupithecia casloata*, Dyar. Meach Lake, Aug. 5, (Young).
- 3,350. *Eustroma propulsata*, Wlk. (*R. packardata*, Lint.), a variety with antennæ dentate and probably in process of evolution towards a pectinated form. The ordinary form is simple ciliate. Frazer Falls, Y.T., Aug. 22, 1905, (J. Keele).
- 3,362. *Rheumaptera luctuata*, D. & S. a. *obductata*, Moesh, Lansing River, Y.T., June 24, (Keele).
- 3,425. *Cænocalpe polygrammata*, Hulst. A pair on Red Deer River, July 3 and 6, (Dod & Hudson). The first records for Canada, (G. W. Taylor).
- 3,695. *Cymatophora brunneata*, Thunb. Hope Mts., July 20, (Harvey).
- 3,709. *Cymatophora latiferrugata*, Wlk. Ottawa, emerged from pupa, Aug., larva on *Prunus pennsylvanica*; black, with conspicuous white spots on sides, (Fletcher). A distinct species from *C. pustularia*.
- 3,734. *Cymatophora denticulodes*, Hulst. Two males at light on Pine Creek, July 22 and 25, (Dod). Hope Mts. July 18, (Harvey). New to Canada. (G. W. Taylor.)
- 3,773. *Platea trilinearis*, Pack. Not uncommon on Red River bottom, north-east of Gleichen, amongst prairie sage, *Artemisia ludoviciana*, in early July, (Dod & Hudson). Mr. Taylor says that this species was not previously known from Canada, with the exception of a possibly erroneous "B.C." record.
- 3,902. *Sicya macularia*, Harr. Sturgeon River, West of the Tamagami Region, July 17, (W. J. Wilson).
- 3,909. *Therina athasiaria*, Wlk. Meach Lake, June 17, (Young). The first record for the Ottawa district.

- 4,266. *Glaphria psychicalis*, Hulst. Trenton, one specimen, July 12, (Evans).  
 4,308. *Sylepta penumbralis*, Grt. Trenton, 4 specimens at light, May 17, Aug. 12, (Evans).  
 4,321. *Diaphania quadristigmalis*, Gn. Toronto, (Hahn).  
 4,323. *Metrea ostreonalis*, Grt. Meach Lake, July 16, very rare, (Young).  
 4,386. *Tholoria reversalis*, Gn. McNab's Island, July 10, 1904, (Perrin).  
 4,414. *Cindaphia bicoloralis*, Gn. Trenton, Aug. 20, at light, (Evans).  
 4,455. *Pyrausta generosa*, G. & R. Trenton, at light, May 27, (Evans).  
*Eurrhyncha urticata*, L. Milton, N.S., July 6, 1906, (W. H. Moore). This common European species which feeds upon the stinging-nettle was first found by Mr. Moore, and was kindly identified by Dr. H. G. Dyar, who reported, "not known in North America." Since the receipt of Mr. Moore's specimens I have had an opportunity of examining Mr. Wm. McIntosh's collection in St. John, N.B., where I found several specimens of this moth. Mr. McIntosh tells me it is common in the district.  
 4,496. *Nymphula oblitalis*, Wlk. Trenton, 2 specimens, (Evans).  
 4,499. *Elophila bifascialis*, Rob. Trenton, 3 specimens, Aug. 14, (Evans).  
 4,519. *Herculia cohortalis*, Grt. Trenton, June 30, Aug. 6, (Evans).  
 4,544. *Schænobius tripunctellus*, Rob. Trenton, one specimen, June 25, at light, (Evans).  
 5,014. *Exartema zellerianum*, Fern. Trenton, July 19, (Evans).  
*Eucosoma confluenta*, Kearf. Trenton, one specimen, at light, Aug. 24, (Evans).  
 5,287. *Ecdytolopha insiticiaria*, Zell. Trenton, 2 specimens, June 25, and Aug. 24, at light, (Evans).  
 5,336. *Cenopis Pettitana*, Rob. Trenton, (Evans); Ottawa, larva on bass-wood, May 31; pupa, June 7; moth, June 16, (Gibson).  
 5,419. *Eulia quadrifasciana*, Fern. Trenton, two specimens, July 8 and 22, at light, (Evans).  
 5,818. *Gelechia omatiformbriella*, Clem. Trenton, at light, June 25, and July 7, (Evans).  
 5,865. *Depressaria psoralisella*, Walsm. Trenton, one specimen, at light, Sept. 5, (Evans).

The following valuable notes on some species of microlepidoptera have been received from Mr. W. D. Kearfott, and are gratefully included:

"Since the brief list of notable captures was written for the 1904 Entomological Record, I have had the privilege of examining a very large number of Canadian specimens, and mention the following as being especially interesting. Several of them are new records for Canada.

"This list could be continued almost indefinitely, but its usefulness is limited, because there is no strictly Canadian list of Lepidoptera. I would strongly urge the compilation of such a list. With such a basis to work from, the friendly rivalry to add names to it would be very much stimulated. I have records of several hundred names of Microlepidoptera, and my notes and help are freely offered to any one who may care to undertake this task.

"I desire again to extend my sincere thanks to the gentlemen who have so kindly sent me their material for examination and determination, and for their most generous treatment in the cases of unknown and desirable species, especially Messrs. Young, Criddle, Marmont, Heath, Evans, Willing, Dennis, Taylor, Saunders, Winn, Gibson and Fletcher.

4,569. *Crambus bidens*, Zeller. Specimens of both sexes from Mr. Young, Ottawa, July 11. Very rare as yet in general collections.



- 4,583. *Crambus myellus*, Hbn. Hurdman's Bridge, Ont., July 26-30. This species is recorded from Europe, Maine and Nova Scotia. It is very rarely met with, and Mr. Young's specimens are the first I have seen.
- 5,137½. *Eucosma suffusana*, Zell. This European species has never been recorded from America, but is likely to prove of considerable economic importance after a few years. I have recently received specimens for determination from several localities in New Jersey and Pennsylvania, Portsmouth, N.H., and Regina, Sask., (Willing), August 15. Early this spring I bred the moths from larvæ crumpling and rolling the young leaves of my rose bushes and eating the entire bud. The larva is transparent pinkish green, almost slug-like in shape. I have not had it from Eastern Canada; but it will be found wherever roses grow.
- 5,189. *Thiodia signatana*, Clem. Received from Mr. Gibson, and labelled "Miner in maple leaves, Kirk's Ferry, issued Sept. 18." This species is quite common in Montclair and, during June, can be found in abundance on the trunks of the red maple.
- The larvæ are found in September, living in a tube on the underside of the leaf, and still further protected by a web of silk across the leaf, from edge to edge. It would be interesting to know if its habits are different at Kirk's Ferry; possibly the term "Miner" referred only to the young larvæ, immediately out of the ova.
- 5,298. *Carpocapsa toreuta*, Grote. One specimen received through Dr. Fletcher, labelled "Bred from cone of *Pinus ponderosa*, British Columbia (Interior), (J. R. Anderson)." This is another very rare species; only one or two other specimens are known.
- 5,325. *Acleris angusana*, Fern. Hurdman's Bridge; bred from larvæ webbing the leaflets of hemlock. Mr. Young sent me eight specimens, exhibiting a great range of variability; a narrow band from base to apex connects them all; but this band ranges from pure white, through the reds to black. The ground color, likewise, in different specimens, ranges from pale yellow, through the reds to purplish black, and in some of the specimens a white transverse angulated band through the middle of the wing; in others, the outer half is paler than the inner. On p. 849, Fifth Report Ento. Comm., Packard records the breeding of this species from spruce and fir, but calls it Var. "E" of *Teras variana*, Fern.
- 5,475. *Carposina crescentella*, Wlsm. Hurdman's Bridge, (Young); locality "unknown" in Dyar's list; it has also been taken in Western Pennsylvania, (Merrick).
- 5,488. *Periclymenobius canariellus*, Wlsm. Hurdman's Bridge, (Young); Rounthwaite, (Marmont). The three species under this genus can easily be recognized by the scythe-like extension of the cilia of the apex of the fore wings, making them veritable hook-tips; I believe all three will be found in Canada from Ottawa westward. I have already recorded *P. frustellus* from Aweme, (Criddle), and Cartwright, (Heath), and also have *canariellus* from Wellington, B.C., (Taylor) and Arizona, (Kunze).
- 5,518. *Euclementia bassettella*, Clem. Hurdman's Bridge, (Young). This is one of the most beautiful of the larger Tineids, a long bar of crimson on an opalescent-black back-ground. It has been

bred from larvæ feeding within small yellowish brown, shining galls on twigs of oak. I do not believe this larva is the cause of the gall, but it makes use of the habitat of a generous (?) Dip-teron.

#### ADDITIONS TO THE MANITOBA LIST.

- 4,521. *Herculia olinalis*, Gn. Aweme, VII., 26 to VIII, 6.  
 4,566. *Crambus unistriatellus*, Pack. Aweme, VIII, 17.  
 4,737. *Nephopteryx hypochalciella*, Rag. Aweme VIII, 16.  
 4,871. *Homocoma mucidellum*, Rag. Aweme, VI., 12.  
 4,965. *Pterophorus subochraceus*, Wlsm. Aweme, VI., 12.  
 5,018. *Exartema versicoloranum*, Clem. Aweme, VII, 12-15.  
 5,022. *Exartema corylanum*, Fern. Aweme, VII., 6-12.  
 5,071. *Olethreutes bipartitana*, Clem. Aweme, VI, 21 to VII, 5.  
 5,073. *Olethreutes impudens*, Wlsm. Aweme, VII., 27.  
 5,132. *Eucosma hirsutana*, Wlsm. Aweme, VI., 14 to VII., 4.  
 5,150. *Eucosma carolinana*, Wlsm. Cartwright.  
 5,255. *Ancylis divisana*, Walk. Aweme, VI., 26-27.  
 5,274. *Enarmonia lunatana*, Wlsm. Aweme, V, 18 to VI, 7.  
*Ancylis cockleana*, Kearf. Aweme, VII., 20.  
 5,339. *Cenopsis groteana*, Fern. Winnipeg, Hanham.  
 5,407. *Tortrix packardiana*, Fern. Aweme, VI., 12.  
 5,834. *Stenoma schloegeri*, Zell. Aweme, VI, 21.  
 5,912. *Ethmia longimaculella*, Cham. Aweme, VI., 21.  
 6,108. *Scythris eboracensis*, Zell. Aweme, VI., 27 to VII., 7.

W. D. K.

The following species of geometridæ have been described in the "Canadian Entomologist" for 1906, by the Rev. G. W. Taylor, of Wellington, B.C., from different parts of Canada.

- Eupithecia regina*. Regina, Sask., June 25, (Willing); Calgary, June 29, July 7, to Aug. 8. (Dod).  
*Eupithecia alberta*. Calgary, June 30, (Dod).  
*Eupithecia adorna*. Calgary, June 26, and July 3, (Dod).  
*Eupithecia adornata*. Calgary, May 25, to June 14, (Dod).  
*Xanthorhoe circumvallaria*. Millarville, June 26, July 24, (Dod).  
*Aplodes hudsonaria*. Fifty miles N.E. of Gleichen, Alberta, July 7, (Hudson); Victoria, August, 1903, (Hanham).  
*Eupithecia olivacea*. Wellington, April 7, 1903, (Taylor); not uncommon at Vancouver (Harvey).  
*Eupithecia harveyata*. Vancouver, Apl. 6, 1903, (Harvey).  
*Eupithecia dyarata*. Kaslo, Apl. 24, not uncommon, (Cockle).  
*Eupithecia hanhami*. Victoria, June, (Hanham).  
*Eupithecia bryanti*. Stickeen River, B.C., July, (Bryant).  
*Eupithecia obumbrata*. Victoria, April to June, (Hanham).  
*Eupithecia modesta*. Vancouver, June 6, (Taylor).  
*Eupithecia insignificata*. Wellington, Victoria and Vancouver, March to May, (Taylor).  
*Eupithecia sublineata*. With above, and thought to be a variety of it.  
*Eupithecia perbrunneata*. Kaslo and Victoria, May 9 to June 2, (Cockle and Taylor).  
*Eucymatoge vancouverata*. Wellington, Vancouver.  
*Eustroma harveyata*. Kaslo, Stickeen River, Vancouver.  
*Zenophleps victoria*. Victoria, (Hanham).  
*Hydriomena autumnalis*, Strom., var. *columbiata*. Victoria, Wellington, May.



*Hydriomena manzanita*. Wellington, April.

*Xanthorhoe pontiaria*. Wellington; Salem, Oregon.

*Xanthorhoe fossaria*. Laggan, Alta., and Mt. Cheam., B.C., (Bush).

*Leptomeris subfuscata*. Victoria, (Hanham); Vernon, (Harvey).

*Deilinia bryantaria*. Stickeen River, June 13, (Bryant).

*Enypia packardata*. Wellington, June to August.

Several species of European geometridæ have been recognized in Canada, for the first time during the year, viz.

*Eupithecia castigata*, Hbn. Wellington, (Taylor); Calgary, (Dod).

*Eupithecia togata*, Hbn. Wellington, (Taylor).

*Hydriomena ruberata*, Freyer. Calgary, (Dod).

*Himera pennaria*, L. Tamarisk, Man., 1903, (L. Fanshawe).

#### COLEOPTERA.

(Arranged according to Henshaw's List of the Coleoptera of America, North of Mexico.)

36. *Cicindela cinctipennis*, Lec. Vernon, B.C., May, one specimen on damp sand, (Venables).
109. *Cychnus angulatus*, Harr. Duncans, B.C., April, (Hanham).
871. *Lebia devisa*, Lec. Regina, April 15, (Willing).
898. *Lebia depicta*, Horn. Regina, Oct. 11, (Willing).
- 1,487. *Dytiscus circumcinctus*, Ahr. Winnipeg, "On a sultry evening in October my son Evan collected about 100 specimens, half of them males; of the females four had sulcate elytra. Prof. Wickham who named my specimens, writes: 'The first American specimens I have seen. The original American locality is Red River, and they may have come from Winnipeg,'" (Evans).
- 2,661. *Boletobius cincticollis*, Say. Aweme, in woods, April 9, (Criddle).
- 2,829. *Olophrum marginatum*, Kirby. Sudbury, one specimen, (Evans).
- 2,899. *Siagonium americanum*, Melsh. Sudbury, one specimen, (Evans).
- 3,696. *Epuræa helvola*, Er. Aweme, at putrid bird, June 3, (Criddle).
- 3,984. *Aræopus monachus*, L. Vernon, on willow blossom, (Venables).
- 4,005. *Holodes thoracica*, Guer. Como, Que., July, Aug., (G. A. Moore).
- 4,275. *Ludius abruptus*, Say. Ottawa, June 20, (Fletcher).
- 9,394. *Chrysobothris ludificata*, Horn. Aweme, April 10, July 16, (Criddle).
- 5,022. *Malachius æneus*, L. Ottawa, June 6, (Fletcher); July 1, (J. A. Guignard). An addition to the Ottawa list.
- 5,177. *Clerus nigriventris*, Lec. Vernon, on pine stump, July 15, (Venables).
- 5,359. *Dinoderus substriatus*, Payk. Barrie, Ont., in hemlock bark, Oct., (Zavitz).
- 5,384. *Hylecætus lugubris*, Say. Fort Kent, Maine, 1900, opposite St. Francis, N.B., (Rev. F. X. Burque).
- 5,525. *Aphodius fœtidus*, Fab. Aweme, April 26, May 4, (Criddle).
- 5,961. *Prionus californicus*, Mots. Grierson's Wharf, on the Ottawa near Fitzroy Harbour, July 30, (Metcalf). A wanderer from the Pacific Coast.
- 6,079. *Tylonotus bimaculatus*, Hald. Guelph, on black ash, July, (Zavitz).
- 6,106. *Ancylocera bicolor*, Oliv. Ridgeway, on hickory, Aug., (Zavitz).
- 6,238. *Toxotus schaumii*, Lec. Galt, on maple, August, (Dr. Bethune).
- 6,304. *Leptura subhamata*, Rand. Guelph, August, (Zavitz).
- 6,345. *Leptura biforis*, Newm. Ridgeway, August, (Zavitz).
- 6,385. *Monohammus titillator*, Fab. Rondeau and Ridgeway, on white pine, June to August, (Zavitz).
- 6,397. *Goes pulchra*, Hald. Ridgeway, on hickory, August, (Zavitz).

- 6,577. *Crioceris asparagi*, L. Ottawa, larvæ found Sept. 20, buried Sept. 22, emerged at end of October; the furthest eastern record in Ontario, (Fletcher & Gibson). Not previously found at Ottawa.
- 7,396. *Calocnemis dilaticollis*, Mann. Vernon, June, (Wilmot).
- 7,852. *Mordellistena bihamata*, Melsh. Como, Que., June and August, (G. A. Moore).
- 7,873. *Stereopalpus mellyi*, Laf. Como, July and August, (G. A. Moore).
- 8,101. *Epicauta fissilabris*, Lec. Saskatoon, June 6, (Willing).
- 8,611. *Magdalis perforata*, Horn. Ridgeway, Aug., on white pine, (Zavitz).
- 8,619. *Magdalis subtinctoria*, Lec. Greenbush, Man., bred from twigs of white spruce, March 4, (Willing).
- 8,634. *Anthonomus profundus*, Lec. Trenton, one specimen, Sept. 27, '03. This has not been so far reported from Canada, (Evans).
- 9,203. *Gonotropis gibbosus*, Lec. Aweme, April 29, (Criddle).
- 9,748. *Cryptorhynchus lapathi*, L. Ridgeway and Beamsville, June 23 to July 30, (Zavitz). Toronto, on one willow only in High Park, but this was completely riddled, (A. Cosens). This destructive weevil which attacks poplars and willows is gradually spreading through North America. These are the first Canadian records.

## DIPTERA.

(Arranged according to a Catalogue of North American Diptera by J. M. Aldrich. Smithsonian Misc. Coll., XLVI, No. 1, 444. The numbers refer to the pages of the Catalogue.)

171. *Bibiocephala grandis*, O. S. Hope Mts., B.C., July 14, (Harvey).
196. *Chrysops delicatulus*, O. S. St. John, July 2, (McIntosh).
196. *Chrysops frigidus*, O. S. Hope Mts., July 18 to 27, (Harvey).
198. *Chrysops proclivus*, O. S. St. John, July 21, (McIntosh).
203. *Tabanus fratellus*, Will. Hope Mts., July 18 to 25, (Sherman).
- Tabanus osburni*, Hine. Hope Mts., July 12 to 25, abundant, (Sherman and Harvey).
209. *Tabanus zonalis*, Kby. Kaslo, (Cockle).
227. *Dipalza serpentina*, O. S. Goldstream, B.C., Aug. 19, (Harvey).
- Anthrax harveyi*, Hine. Hope summit, 5,800 feet, seven specimens, July 20 and 24, (Sherman and Harvey).
241. *Eclimys harrisii*, O. S. St. John, (McIntosh).
256. *Stenopogon modestus*, Lw. Similkameen, July 21, 22, common, (Sherman and Harvey).
258. *Dicolonus simplex*, Lw. Victoria, June 8, (Harvey).
259. *Cyrtopogon aurifex*, O. S. Hope Mts., July 12 to 27, common, (Sherman and Harvey).
259. *Cyrtopogon dasylloides*, Will. Kaslo, (Cockle).
296. *Hydrophorus innotatus*, Lw. St. John, (McIntosh).
383. *Pyritus montigena*, Hunter. Vancouver, Feb. to Apl., (Sherman).
386. *Eristalis inornatus*, Lw. St. John, June 5, (McIntosh).
- Merodon equestris*, Fab. Vancouver, several specimens, (Harvey).
401. *Crioprora alopec*, O. S. Vancouver, March 24, (Sherman).
405. *Temnostoma aqualis*, Loew. Haydon, Ont., July 31, (E. B. Williamson).
412. *Myopa pictipennis*, Will. Vancouver, April 14, (Harvey).
- Cuterebra grisea*, Coq. Hope Mts., July 12, (Sherman).
419. *Cuterebra tenebrosa*, Coq. Kaslo, July 20, (Cockle), Vernon, July, (Wilmot). A magnificent blue-black species nearly an inch long and almost one-half inch across the abdomen.



422. *Cistogaster immaculata*, Macq. Hope Mts., July 15, (Harvey).  
 466. *Masicera myoidæa*, Desv. Meach Lake, bred from *Papaipema apassionata*, (Young).  
 527. *Mesembrina resplendens*, Wahl. Kaslo, (Cockle).  
 605. *Trypeta straminea*, Doane. Wellington, July, 1904, (Harvey).  
 608. *Carphotricha culta*, Wied. Wellington, June, 1905, (Harvey).  
 611. *Tephritis albiceps*, Lw. Victoria, June 8, (Harvey).

#### HEMIPTERA.

We are glad to note an awakening of interest in this important order. Collections have been submitted to Mr. E. P. Van Duzee and kindly named by him, from Mr. W. J. Palmer, of Buffalo, the Rev. G. W. Taylor, of Wellington, B.C., and Mr. G. A. Moore, of Montreal. A list of Mr. Palmer's collection taken near Lake Temagami, Ont., appears in the *Canadian Entomologist* for 1906 at page 406. Some of Mr. Taylor's new species are described in *Entomological News* for Dec., 1906, page 388, and Mr. Moore's collection taken at Como, Que., will be published in an early number of the *Canadian Entomologist*.

The following are considered by Mr. Van Duzee of special interest:—

#### HETEROPTERA.

- Sehirus cinctus*, P. B. Como, July 24, one specimen, (Moore).  
*Banasa dimidiata*, Say. Como, Aug. 12, one specimen, (Moore).  
*Alydus eurinus*, Say. Como, July 20, (Moore).  
*Protenor belfragei*, Hagl. Como, Aug. 2, two specimens, (Moore).  
*Mysius longiceps*, Stal. Como, July 25, two specimens, (Moore).  
*Ligyrocoris contractus*, Say. Como, July 26, several, (Moore).  
*Peritrechus tristis*, V. D. Victoria and Wellington, B.C., March, April and October, (Taylor).  
*Eremocoris obscurus*, V. D. Wellington, March and April, (Taylor).  
*Phlegyas abbreviatus*, Uhl. Como, July 26, several, (Moore).  
*Scolopostethus thomsoni*, Reut. Como, July 2, one specimen, (Moore).  
*Aradus abbas*, Prov. Como, July 1, one specimen, (Moore).  
*Plagiognathus politus*, Uhl. Como, July 15, (Moore); Swamp Creek, and Island Lake, Temagami District, Aug. 14 and 12, (Palmer).  
*Plagiognathus annulatus*, Uhl. Como, July 2, (Moore); Island Lake, two specimens, Aug. 12, (Palmer).  
*Hyaliodes vitripennis*, Say. Como, July 20, (Moore).  
*Pilophorus crassipes*, Stal. Como, two specimens, July 24, (Moore).  
*Phytocoris puella*, Reut. Como. Aug. 2, (Moore).  
*Phytocoris pallidicornis*, Reut. Como, July 14, (Moore).  
*Melinna modesta*, Uhl. Como, July 20, Aug. 1, (Moore).  
*Pæcilocapsus marginatus*, Reut. Como, July 8, (Moore).  
*Trigonotylus ruficornis*, Fall. Como, July 2, (Moore).  
*Mesovelia bisignata*, Uhl. Como, Aug. 1, (Moore).

#### HOMOPTERA.

- Thelia univittata*, Harr. Como, July 27, one specimen, (Moore).  
*Archasia galeata*, Fitch. Como, July 7, one specimen, (Moore).  
*Ophiderma salamandra*, Fairm. Como, Aug. 3, one specimen, (Moore).  
*Carynota marmorata*, Say. Como, July 23, (Moore).  
*Pissonatus marginatus*, V. D. Como, July 8, one specimen, (Moore).  
*Laccocera vittipennis*, V. D. Como, July 25, one specimen, (Moore).  
*Phyllodinus nervatus*, V. D. Como, July 14, one specimen, (Moore).

- Clastoptera proteus*, Fitch, var. *flava*, Ball. Como, July 24, (Moore).  
*Clastoptera proteus*, Fitch, var. *vittata*, Ball. Como, July 25, (Moore).  
*Clastoptera proteus*, Fitch, var. *nigra*, Ball. Como, July 25, (Moore).  
*Bythoscopus variabilis*, Fitch. Como, July 14, on oak, (Moore).  
*Pediopsis insignis*, V. D. Como, July 20, (Moore).  
*Oncometopia costalis*, Fab. Como, July 27, two specimens, (Moore).  
*Draculacephala manitobiana*, Ball. Swamp Creek, Temagami district, Aug. 14, (Palmer).  
*Draculacephala novaboracensis*, Fitch. Como, July 2, (Moore); Red Cedar Lake, Aug. 9, (Palmer).  
*Xestocephalus pulicarius*, V. D. Como, one specimen, Sept. 2, (Moore).  
*Paramesus vitellinus*, Fitch. Como, July 26, several, (Moore).  
*Platymetopius acutus*, Say. Como, July 20, Aug. 4, (Moore).  
*Scaphoideus auroniteus*, Prov. Como, July 30, one specimen, (Moore).  
*Athysanus plutonius*, Uhler. Como, July 2, (Moore).  
*Eutettix seminuda*, Say. Como, July 8, one specimen, (Moore).  
*Thamnotettix smithii*, V. D. Swamp Creek, Aug. 14, (Palmer).  
*Thamnotettix eburata*, V. D. Red Cedar Lake, Aug. 9, Island Lake, Aug. 12, and Swamp Creek, Aug. 14, (Palmer).  
*Thamnotettix waldana*, Ball. Swamp Creek, Aug. 14, (Palmer).  
*Jassus olitorius*, Say. Como, Aug. 12, (Moore).  
*Empoasca viridescens*, Walsh. Como, July 31, (Moore).  
*Eupteryx flavoscuta*, Gill. Como, July 15, several, (Moore).  
*Typhlocyba tricineta*, Fitch. Como, July 2, (Moore).  
*Typhlocyba bifasciata*, G. & B. Como, July 21, (Moore).

#### ODONATA.

Up to the present time, although a good deal of work has been done spasmodically in working up the Dragon-flies of Canada by collectors in different parts of the Dominion, as far as I am aware, no complete Canadian list has ever been prepared. That this should be taken in hand at once, is most desirable, both on account of the important role played by these insects and also from their attractive nature. Some years ago Mr. T. J. McLaughlin worked up the species of the Ottawa district, and Dr. E. M. Walker, of Toronto, has recently made extensive studies of the Odonata of the whole Province of Ontario. Up to the end of last year he had listed 65 species, and a few others have been added during the past summer. A list of 37 British Columbian species prepared by Prof. Raymond C. Osburn, of New York, is reproduced from *Entomological News* in the September Bulletin of the British Columbia Entomological Society. As already mentioned, Mr. E. B. Williamson, of Bluffton, Ind., made a short trip into Northern Ontario during the past summer for the special purpose of collecting Odonata, and Mr. McIntosh has collected in New Brunswick.

Entomologists will be pleased to learn that Dr. E. M. Walker has undertaken a complete revision of the genus *Æschna* in North America. He thinks that "the determinations of the species have been to a large extent guess work, and that not sufficient account has been taken of the females and of the colour markings." Dr. Walker writes: "I have already come to pretty definite conclusions as to the limits of the species, and find there are several more than has been believed by the best authorities to be the case. Females and colour pattern prove to be of great importance and individual variations within the species but slight. I am going to verify as far as possible my conclusions in the field next summer, but would like to



examine as much material as possible this winter. I shall be glad to receive any material in this genus, which will be taken great care of and returned named as soon as I have finished with it." This excellent opportunity for getting material worked up should not be neglected by collectors, and it is to be hoped that all will assist Dr. Walker to the full extent of their ability in this useful undertaking.

A small collection of Odonata collected in the Temagami district by Mr. W. J. Wilson, of the Geological Survey, in 1905, has been named by Prof. J. G. Needham, who reports as follows: "These are all more or less common throughout eastern Canada; but the specimens are of much interest, as they extend the known northward range for practically all of them." The list is as follows:—

*Gomphus sordidus*, Hagen. Kokokosing Lake, June 13, and Sturgeon River, June 29, 4 males and 8 females.

*Gomphus exilis*, Selys. Smooth Water Lake, June 22, 2 males.

*Calopteryx maculata*, Beauv. Sturgeon River, July 29, July 16.

*Hagenius brevistylus*, Selys. Kettle Falls, Sturgeon River, June 30.

*Æschna clepsydra*, Say. Kettle Falls, Sturgeon River, June 30.

Dr. Walker sends the following records:—

*Somatochlora walshii*, Scudd. DeGrassi Point. First Ontario record.

*Somatochlora williamsonii*. "I am about to describe under this name some specimens which I have had in my collection for several years, but I was not certain until recently that they were distinct from *S. elongatus*, Scudd. Mr. Williamson has taken the species in Michigan and Prof. Needham in New York. The former had recognized it as a new species and has turned his material over to me. The description will appear in the *Canadian Entomologist*. Ontario records: Toronto, DeGrassi Point, Lake Temagami." (Walker.)

*Enallagma pollutum*, Hag. Bala, Muskoka, Aug. 25, (W. J. Fraser).

*Gomphus adelphus*, Selys. Hull, P.Q., June 29, 1886, (Fletcher).

The first Canadian record.

*Gomphus brevis*, Selys. Hull, P.Q., June 29, 1886, (Fletcher); Cumberland Ont., June 16, 1900, (Gibson).

*Æschna juncea*, L. Anticosti, 1902, (Dr. Joseph Schmitt); DeGrassi Pt., Lake Simcoe, Ont., Sep. 2, (Walker).

*Basiaeschna janata*, Say. Clarke's Bush, Ottawa, May 2, 1902, (Gibson).

*Macromia illinoensis*, Walsh. Hull, P.Q., June 29, (Fletcher).

*Helocordulia uhleri*, Selys. Buckingham, P.Q., May 31, (Fletcher).

*Tetragoneuria spinosa*, Selys. Hull, P.Q., May 22, 1886, (Fletcher).

*Leucorhinia hudsonica*, Selys. Short Bay, on Behm Canal, B.C., August 11, (J. A. Cadenhead); Anticosti, (Dr. Schmitt); Laggan, Alta., (T. E. Bean); Eastman's Springs, Ont., May 25, Hull, P.Q., June 29, (Fletcher).

*Sympetrum costiferum*, Hag. Victoria, B.C., (Fletcher).\*

*Sympetrum corruptum*, Hag. Banff, Alta., Sept. 13, 1897, (N. B. Sanson); Laggan, Alta., (T. E. Bean).

*Tramea lacerata*, Hag. Several fresh examples of this large southern dragonfly were seen near Grenadier Pond, Toronto, Sept. 15, 1906. I had no net, but succeeded in capturing a fine male. A few days afterwards they had all disappeared. (Walker.)

## IN THE TRACKS OF NEMATUS ERICHSONII, HARTIG.

BY REV. THOMAS W. FYLES. D.C.L., F.L.S.

It is a law of nature that no particular growth of plants should hold possession of the land in perpetuity. Sooner or later destructive agents will break in upon the scene. Insect depredators, drought, fire, storm and flood—these, and the axes of the lumbermen, make clearances for occupation by the settler, or for Nature's re-planting. In the latter case we find that the new growth is, generally speaking, different from the old. The following affords a curious exemplification of this fact:—

In 1842, when the Ashburton Treaty was made, a strip, 60 feet wide, was cut along the border, through the tamarack swamps that extend from Canada into New Hampshire and Maine. This strip is now filled up with a new growth; but the forester knows directly when he strikes the line, for he finds a belt in which the poplar (*Populus tremuloides*), the red cherry (*Prunus Pennsylvanica*), and the Moosemissie (*Pyrus Americana*), are growing, the seeds of the first having been carried by the wind into the Boundary, when newly cleared; and those of the last two, by birds.

Thirty years ago it was a fine sight to look, from an elevation, upon the vast area of swamp land, extending through Bury, Lingwick, Hampden, Ditton, and far away. Tamaracks from two feet to two and a half feet in diameter, were the lords of this forest-land. To-day, I have the authority of Mr. Ayton Cromwell and Mr. C. C. Lusk, of Cookshire, and Mr. C. H. Ward, of Bury—all experienced foresters—for stating that not a single first-growth tamarack is to be found in the whole section. And like testimony comes to me from Mr. John D. Johnson, of St. Thomas, and Mr. E. W. Brewster, of Compton, in regard to the districts with which they are respectively acquainted.

How was the destruction brought about? By an agent seemingly insignificant and wholly unexpected—a four-winged fly, belonging to the order *Hymenoptera*, and named by Hartig, *Nematus Erichsonii*.

This fly is only about eight-tenths of an inch in expanse of wings, and four-tenths in length of body. Its colour is black, but it has a broad orange-red band round the abdomen. Its wings are clear, with dark veins, and a conspicuous costal spot or *stigma*.

In the larval stage—which is the destructive stage—the species is a green caterpillar of no great size, having a black head. When it is “full-fed,” it creeps into some retreat, and spins a compact, brown cocoon, about half an inch in length.

It was in the pupal stage, probably, and amongst the roots of young plants of Norway Spruce, that the species was brought to the nurseries of Massachusetts, about the year 1880.

The first notice of the arrival of the *Nematus* in Canada was given by myself, and will be found on the 17th page of the Report of the Entomological Society of Ontario for 1883. When the creatures came to us, they came in their strength—“In numbers numberless.” The *Nematus* Raid, as it was called, was a phenomenon that they who witnessed are not likely to forget. That creatures seemingly so insignificant, brought unwittingly from a country so far away, should, by force of numbers, be able to strip the vast forest of tamarack of its verdure, and leave the trees in a dying state was truly marvellous.

I last saw the creatures in activity about ten years ago, in a grove of young tamarack near the old St. Henry Road, in Levis County. The trees were about twenty feet high; and here and there amongst them was a small



colony of *Nematus* larvae. The grove mentioned has lately been felled, and the land it occupied turned into a pasture.

The *Nematus* larvae had a preference for the finest growths. The smaller trees of the time were not at first so badly treated by them; and these lingered on, making brave efforts at recovery; but even these have for the most part, now succumbed. Probably the drought of 1903 gave the finishing blow to them.

Mr. E. B. Brewster tells me that half a mile from Compton Village, there is a tamarack swamp about a mile long and one-eighth of a mile wide. The largest trees in it are ten or twelve inches in diameter. Of all the trees in the swamp, probably 75 per cent. are dead, and about 15 per cent. show some signs of feeble life in tufts of sprouts from the stem. The only apparently healthy trees are on the borders of the swamp, and form a mere narrow fringe to it, one or two trees deep.

Of the dead trees in this swamp, some are only "rampikes," denuded both of branches and bark. To others the branches still cling. Here and there, among the dead trees, a few balsams (*Abies balsamea*) and cedars (*Thuja occidentalis*) are springing up.

When I visited the swamps in Bury in 1891, the rot had struck into the dead trees for two or three inches. For an account of this visit, and a calculation of the damage done by the *Nematus*, see the Report of the Entomological Society of Ontario for 1891, page 28.

When the Rutland Railway into Canada was in contemplation, dead tamarack trees lay so thickly in the swamp half way between Alburgh and Noyan, that they had to be hauled out of the way, before the survey for the line could be effected. This was in the fall and winter of 1898-9. The authority for this statement is Mr. Alanson Vosburgh, per Miss May G. Johnson of Miranda, P.Q.

In the part of Bury where I saw Maddock's gang getting out the knees for vessels in 1891, the land has been brought under cultivation.

A few notes to tell further of the kinds of trees that are springing up in place of the tamarack may be desirable.

In the Ditton Swamp, which is about three miles long and a mile broad, the tamaracks young and old are all dead. Spruce is taking their place.

In the Spalding Hill Swamp, in Eaton Township, cedar, poplar and some young tamarack are growing.

In the Harrison neighborhood in Bury Township, in parts where the soil is sandy, white birch and a few balsams are growing; on wet clay, the poplar appears.

In Long Swamp, which extends through Newport, Hampden, and over to Lingwick, spruce and balsam are growing.

To those who would see a tamarack swamp in its infancy, I would recommend a visit to "The Gomin," which lies to the west of Bergerville, about four or five miles from Quebec. In the early Summer it is all aglow with rhodora, sheep-laurel, orchids and pitcher-plants. When I first saw it in 1886, it was a broad expanse of sphagnum, unoccupied, save on its outskirts, by any larger plants than those I have mentioned. I re-visited the swamp on the 10th of July last, and found that it was dotted all over with young tamarack from a foot to fifteen feet high. On the borders of the swamp near the cultivated land there were tamaracks twenty-five feet high or more.

Doubtless, if left undisturbed, the growth on this tract will, in process of time, become a forest. And so—

"The old order changeth and giveth place to new."

## THE NOTODONTIDAE OF THE PROVINCE OF QUEBEC.

BY REV. THOMAS W. FYLES, D.C.L., F.L.S.

This interesting group of insects is not as well known as some other families of the Lepidoptera. *Datana ministra* Drury, *Nerice bidentata* Walker, *Summerista albifrons* Smith and Abbot, and *Schizura concinna* S. and A. are not uncommon with us; but other species are extremely rare; such are *Odontesia elegans* Strecker, *Dasylophia thyatiroidea* Walker, *Heterocampa pulverea* Grote and Robinson, and *Cerura multiscripta* Riley. Of each of these kinds I have taken but one specimen in many years.

Imagos of the different species are sometimes attracted by light, and sometimes they are found at rest on palings and the bolls of trees. They are generally regarded as prizes by Entomologists.

The larvae of most of the Notodontidae are remarkable objects. Some of them assume grotesque attitudes; for instance *Datana ministra* Drury, which raises the fore and hindmost parts of its body in a threatening manner and takes the form of a bow. Some, in their early stages, are strangely horned, as is the case with *Heterocampa guttivitta* Walker in the first stage, and with *Heterocampa biundata* Walker in the first and third stages. Probably in these stages they are most in danger from ichneumons. Others again are furnished with tooth-like prominences on the back, as *Hyperaeschra stragula* Grote.



FIG. 26—Larva of *Pheosia dimidiata*. (Herrich-Schaeffer.)

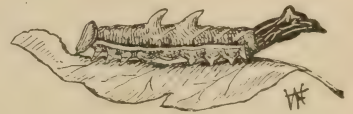


FIG. 27—Larva of *Schizura unicornis*. (Smith and Abbott.)

The handsome larva of *Pheosia dimidiata* Herrich-Schaeffer (Fig. 26) has a very rakish appearance. Its long body straight and trim, with its beak-shaped anal horn, is suggestive to me of an ancient galley, or an Algerine pirate boat—the conspicuous spiracles look like the openings for a bank of oars.

The green larva of *Nerice bidentata* Walker affords a fine instance of mimetic analogy. It feeds on the edges of a leaf; and its jagged dorsal-outline presents a resemblance to the leaf's serrations.

The larvae of *Summerista albifrons* Smith and Abbot, and those of *Schizura concinna* S. and A., (Fig. 27) have gouty swellings highly colored. To gardeners the larvae of *concinna* are known as "Red-humped Caterpillars." They are sometimes very injurious to young apple trees. Where apple trees are scarce, as in the neighborhood of Quebec city, they feed on the blackberry, etc. The *albifrons* larvae are often abundant upon basswood. They have the habit of hoisting the hinder parts of their bodies, and opening their claspers wide until they resemble nippers.

The larvae of *D. ministra* feed on the birch, hazel, butternut, etc. Those of *Melalopha inclusa* Hubner spin webs upon the poplars.

The four last named species are gregarious.

The caterpillars belonging to the genera *Cerura* and *Harpyia* (the moths of which are familiarly known as "Kittens") are furnished with extraor-



dinary forked and whip-like tails, which can be raised and thrown forward and agitated, as occasion requires. They are believed to be protective—their motion intimidating the ichneumons that would assail the larvae. The species have been called, on account of these tails, *Dicranuridae* (*Dikranos*, two-pointed; *oura*, a tail).

A *Dicranura* larva, when "full fed," forms a compact cocoon, into which it works particles of the substance to which it attaches itself. Some seasons ago, at the bottom of my insect breeding-cage, there was lying a dead pupa of a hawk-moth. A larva of the kind mentioned chose to fasten itself upon this, and to work frayings from the case into its cocoon; this, in its finished state, was apparently a mere excrescence of the hawk-moth pupa.

The imāgos of the Notodontidae are, generally speaking, of good size and fine appearance. The smallest of our Quebec species (as far as I know them) are: *Melanopha inclusa* Hubner, and *Gluphisia septentrionalis* Walker. The former is the "*Clostera Americana*" of Harris, and is fully described in the "Insects Injurious to Vegetation" of that author, pages 431-4. The forewings of the moth are grey, clouded with rust-red and brown. It may readily be known by the whitish V-like mark extending across the forewing. It expands an inch and a quarter. The latter species is a prettily marked one. The base of the forewing is brownish grey; then comes a band of pale grey, and then a central band of warm brown, bordered on either side with a dark brown line. In this band not far from the costa is a pale spot. Beyond the central band the wing is pale grey, clouded with darker grey, and having a wavy line of black dots near the hind margin. The insect expands an inch and two lines.



Fig. 28.—*Datana ministra*.

*Datana ministra* Drury is a fine moth. (Fig. 28.) It varies in color from reddish ochre to brown. The hind margin, in the fore-wings, is crenated. Not far from the base of the wing is a curved cross-line; and, beyond this, are three parallel cross-lines. Running from the outer angle, for a short distance, into the wing, is a curved line. *Ministra* measures two inches in expanse of wings.

*Hyperaeschra stragula* Grote is a handsome moth. Its fore-wings are richly colored with dark grey, brown and red. Near the hind margin is a beautiful feathery line. The hind wings are white with a touch of brown at the inner angle. The insect is an inch and five lines in expanse of wings.

To my mind the Queen of Beauty among the Notodontians is the Elegant Prominent, *Odontotia elegans* Strecker. (Fig. 29.) It measures an inch and ten lines in expanse of wings. Its fore-wings are of a soft rich dove color. From the tooth on the inner margin of the wing to the base is a patch of brick-red; and at the hind margin are two parallel, scalloped, dark lines. The hind wings are white with a purplish patch on the inner angle.

The bill-hook like curve that is seen in the inner margins of the fore-wings of several of the Notodontians is conspicuous in *O. elegans*. Other species that have the curve are:—*Hyperaeschra stragula* Grote, *Notodonta*

*basitriens* Walker, *Lophodonta ferruginea* Packard, *Pheosia dimidiata* Herrich-Schaeffer, *Heterocampa biundata* Walker, *Ianassa lignicolor* Walker.

*Notodonta basitriens* Walker is another fine insect. It is an inch and ten lines in expanse of wings. Its fore-wings are brownish-grey, with a reddish brown base outlined with brown of a darker shade. It has two transverse lines, scalloped inwardly, at about two-thirds of the length of the wing. The bases of the wings of *basitriens* are suggestive of a small moth, with outspread wings, superincumbent upon the larger one, but in reverse position.

*Heterocampa pulverea* Grote and Robinson, a pretty grey moth, has somewhat of the same appearance (on a more extended scale); and so has *Macrurocampa marthesia* Cramer. The prevailing colour of the last named insect is creamy white. The base of the wing is of a warm brown outlined with darker brown. Near the centre of the wing is a distinct brown oval spot. The insect is an inch and eight lines in extent of wings. *H. pulverea* is an inch and a half.

A remarkably handsome moth is *Lophodonta ferruginea* Packard. It is two inches in expanse of wings. Its prevailing tint is a rich coffee-colour. It has white and brown scalloped lines crossing the fore-wings, and a large white patch on the costa of each of these wings.

*Pheosia dimidiata* Herrich-Schaeffer (Fig. 30) is one of the largest of our Notodontians—it is two inches and two lines in expanse of wings. It is our Canadian "Swallow Prominent." The prevailing colour of its wings is white; but in some specimens this is tinged with brown. It has an elongated dark brown patch on the lower part of the costa, broken into by a white curved line. Along the inner margin, the fore-wing is dark brown;



FIG. 29.—*Odontosia elegans*.  
(Strecker.)

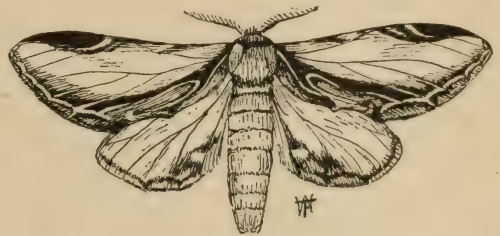


FIG. 30.—*Pheosia dimidiata*. (Herrich  
Schaeffer.)

and this colouring gradually fades and narrows along the hind margin till it ends at the outer angle. It is interrupted by white linear markings, one of which takes the form of a long oval. At the inner angle of the hind wing is a brown patch.

A fine moth of neat colouring is *Nadata gibbosa* Smith and Abbot. It is an inch and ten lines in expanse of wings. Its prevailing tint is ochreous, and it has a band of darker colour across the fore-wing, narrowing towards the inner margin. Within this band, not far from the costa, are twin white spots, small but distinct. *Gibbosa* bears a remarkable projecting crest on its thorax.

*Nerice bidentata* Walker and *Symmerista albifrons* Smith and Abbot are well known moths. In the former, the brown and grey of the fore-wings in striking contrast—the brown having two tooth-like projections—in the latter the conspicuous white border to the lower half of the costa are features that are easily recognizable.



*Dasylophia thyatiroides* Walker expands an inch and eight lines. It is of a light warm brown. The hind margin, in the fore-wings, is sharply indented. On the hind margin there is an oval spot; and on the inner margin a white lunette bordered with black. Curved lines extend from this across the wing.

*Heterocampa biundata* Walker is a handsome ample-winged moth. It is grey with an olive tint, and is marked with wavy lines. The hindmost of these presents a dotted appearance. The moth expands about two inches.

*Heterocampa manteo* Doubleday and *Heterocampa guttivitta* Walker are moths difficult to describe for general readers. Their tints are blended grey and brown and they have numerous dotted lines across the wings. The expanse of wings of *manteo* is an inch and seven lines; that of *guttivitta* is an inch and a half. *Manteo* has dark brown serrations on the hind margins of both primaries and secondaries. *Guttivitta* has a band across the primaries, feather like, with a large brown dot in each curve of the band.

*Ianassa lignicolor* Walker is an insect of trim and neat appearance. Its fore-wings are whitish grey darkened towards the hind margin. The fore-wings have a somewhat striated appearance. Across the middle of each of them is a confused brownish band, and beyond it is a second less distinct. The hind margins of these wings are crenated. The moth expands an inch and three-quarters.

*Schizura concinna* Smith and Abbot is the moth that comes from the "Red-Humped Caterpillar." It is of a rather insignificant appearance. Its fore-wings are reddish-brown, its hind wings grey, with a white border. It is an inch and five lines in expanse of wings. *Schizura semirufescens* Walker is somewhat larger than *concinna*, but in no way more attractive.

*Schizura unicornis* Smith and Abbot is easily recognized from its habit of wrapping its wings around its body, and raising itself at an angle from its support, so that it looks like a leafless twig. Its fore-wings are richly variegated with grey, brown, red and yellow, and have numerous cross-markings. The species measures an inch and four lines in expanse of wings.

The moths called the "Kittens" come next in order.

In Packard's "Forest Insects," page 566, Riley's cut of *Cerura multiscripta* Riley is given. The insect has white fore-wings prettily marked with transverse black lines. I have one specimen taken at Cowansville long ago.

*Harpyia borealis* Boisduval is a pretty moth with pale grey fore-wings, crossed with a band of dark grey outlined with black. It has, near the hind margin, a dark grey patch extending from the costa half way across the wing. Both fore and hind wings are conspicuously dotted along the hind margins with black.

*Harpyia cinerea* Walker is a plainer insect than *borealis*. It has dark grey fore-wings and white hind wings; both bordered with black dots on the hind margins, as in the case of *borealis*.

In *Harpyia scolopendrina* Boisduval the cross band takes the outline of an hour-glass.

Usually the "kittens" are about an inch and four lines in expanse of wings. The larvae of all the species are found upon willows.

I have no doubt there are other kinds of Notodontidae to be found in Quebec Province, but I have not been so fortunate as to meet them. The study of this interesting family of insects will repay the Entomologist for his time and attention in the gratification it will afford him.

## THE LOCUST MITE.

By T. D. JARVIS, ONTARIO AGRICULTURAL COLLEGE, GUELPH.

During the past summer the Locust Mite (*Trombidium locustarum*, Riley) has been very common at Guelph, especially on the Red-legged Locust (*Melanoplus femur-rubrum*), but a few specimens have also been found upon the Two-striped Locust (*Melanoplus bivittatus*). The mite is most generally found attached to the base of the second pair of wings, although it is also found on the wing itself, and on any other part of the body where it cannot be readily detached by the locust; a favourite position upon the body is between the segments of the thorax and abdomen, and also behind the upper joints of the legs; in such positions their only means of attachment to their host is apparently by their mandibles.

The young mites are nearly spherical, and look very much like the eggs of insects (Fig. 32, *b*). The mite sucks the blood of its host until it reaches maturity, during which time it often becomes so swollen with food that its legs are rendered very inconspicuous (Fig. 31, *a*). As many as five of these young larvae have been found upon a single locust.

The adult mite is of a bright crimson color and about one-eighth of an inch long (Fig. 31, *c*, *d*). When full-grown it passes to the ground, where it remains over winter. Dr. Riley, who has studied the life-history of this mite, states that the eggs are laid an inch or so under the ground in clusters containing between 200 and 400. Early in the spring from these eggs emerge the young mites, which, upon reaching the surface of the ground, attach themselves to their hosts. These little mites render good service in checking the spread of the locusts, as almost every locust upon which one is found appears to be more feeble and sickly than those which have not been attacked.

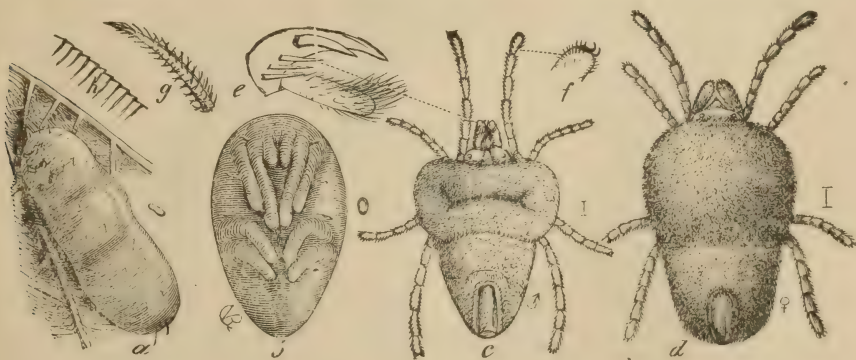


FIG. 31.—*TROMBIDIUM LOCUSTARUM*.—(a) mature larva when about to leave the wing of a locust; (b) pupa; (c) male adult fresh from the pupa; (d) female—the natural sizes are indicated by the short lines on the right (c) palpal claw and thumb (f) pedal claws; (g) barbed hair; (h) the striations on larval skin (after Riley.)

## THE OYSTER-SHELL BARK LOUSE.

By T. D. JARVIS, ONTARIO AGRICULTURAL COLLEGE, GUELPH.

The purpose of this article is to place before the fruit-growers and all interested in practical entomology, the main facts regarding the life-history, habits and appearance of the Oyster-shell Bark Louse Scale, and of the scales which are often mistaken for it. The damage done by this scale of late



years has attracted so much attention, and so many enquiries have been received concerning the best methods for its eradication, that it is hoped earnest efforts will be made at once by all concerned to get it under control.

The Oyster-shell Bark-louse (*Mytilaspis pomorum* or *Lepidosaphes ulmi* Linn, as it is now called) is widely scattered throughout the orchards of Ontario, and the damage done by it is very considerable over the Province and rapidly on the increase.

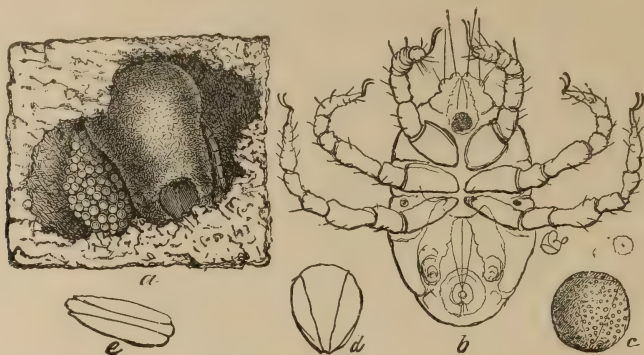


FIG. 32—*TROMBIDIUM LOCUSTARUM*—(a) female with her hatch of eggs: (b) newly-hatched larva—natural size shown by the dot in a circle on the right; (c) egg; (d, e) empty eggs-shells (after Riley.)

Although of European origin, it has been known in America for more than a century, and has gradually spread throughout the larger portion of North America.

This scale is a very serious pest in orchards which are neglected and badly treated, but experience has shown that with careful treatment it can be readily kept in check. It has been found to occur on the following trees and shrubs: Apple, plum, pear, wild red cherry, grape, currant, rose, maple, poplar, ash, birch, and various others.

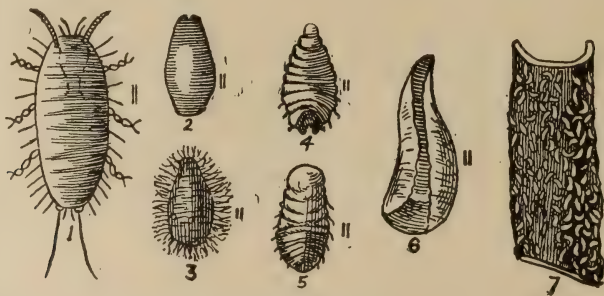


FIG. 33—The Oyster-shell Bark-louse.

In order to combat this scale, it is first absolutely necessary that one should be well acquainted with its life-history.

*Life-history.*—This minute insect, found upon the bark of the small twigs and also upon the branches and trunks of the above-mentioned trees, is readily identified by its oyster-shell-shaped scale, about one-sixth of an inch in length. It is of a brown colour, and, thus disguised by the bark, is not seen unless by close observation. Usually a good many are clustered together, and their shape is so marked that orchardmen should soon recog-

nize them. These scales sometimes cover twigs and large branches completely; even the leaves are often infested, and sometimes the fruit itself becomes more or less covered. Last year the fruit on several Maiden's Blush apple trees grown in the orchard of the O. A. C. was noticed to be affected by the scale. This, however, is the exception rather than the rule.

The insect is one-brooded, and winters over in the egg stage. The eggs can be easily seen if at any time in the fall or winter the old scales be lifted up and examined beneath. Numbers of very small whitish-yellow eggs will be seen. Here beneath this oyster-shaped scale they remain until early in the summer. The young yellow lice escape from the eggs during the last week in May and the first week in June; that is, in the vicinity of Guelph. They

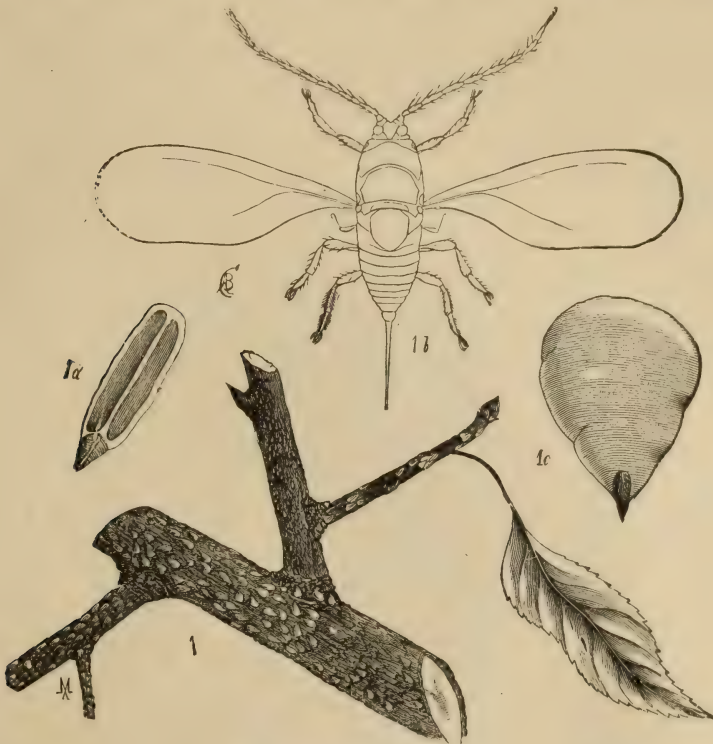


FIG. 34.—The Scurfy Bark-louse.

wander for a few hours, or a few days, on the limb, then settle down and secrete a scale. They fix themselves upon the tender bark, which they pierce with the beak-like structures connected with their mouths, and by means of which they are able to suck from the tree. The larvae moult, or shed their skins, twice in the course of their growth during the summer. These moults can be readily seen on the narrow end of the large scale. The adult female dies soon after the laying of the eggs, about 60 in number, in the fall. They may be spread from tree to tree to some extent by birds, and also by other insects.

Such is the life-history of the Oyster-shell Bark-louse, and before entering into a discussion as to the best means to adopt for its eradication, it will be as well to briefly mention and describe one or two other species of the commonly-occurring scales which most closely resemble it, and to point out the differences for this purpose cuts are given with the various scales.



*The Scurfy Bark Louse (Chionaspis furfurus).*—The Scurfy Bark-louse is not so widely distributed through Ontario as the Oyster-shell Bark-louse, and does less damage. It occurs most commonly on pear, apple, gooseberry, and black currant. This scale resembles the Oyster-shell Bark-louse closely in shape and size, the main points in which they differ being in the colour of the eggs and in the adult scale.

The eggs of the Scurfy Bark-louse are of a purplish colour, whilst those of the Oyster-shell are a whitish-yellow. The adult scale of the Scurfy Scale is also white in colour. The female scale is much larger and more oval than the male scale.

The same remedies may be employed against the Scurfy Bark-louse as are advised in this article as being most suitable for the Oyster-shell Bark-louse.

*San Jose Scale (Aspidiotus perniciosus).*—The San Jose Scale is readily distinguished by the characteristic shape of the female scales. They are round and nearly white, with generally a clearly-defined central nipple. After the first moult the scales become almost black, with a conspicuous depressed ring around the nipple. The adult male scale is oblong in outline, with the nipple near one end, and is much smaller than the female.



FIG. 35—San Jose Scale.

The following points will clearly separate the San Jose Scale from the Oyster-shell Bark-louse and the Scurfy Scale:

First: The arrangement or grouping of San Jose Scales on the bark is generally characteristic, and is often sufficient to at once identify them.

They seldom have a tendency to cluster, if there be few in number, but, instead, are scattered somewhat evenly on the bark.

On badly-infested trees the presence of the scale on new growths and the fruit produces a deep-red coloration on the tissues of the bark.

It leaves no conspicuous, ventral, whitish scale on the bark after the removal of the insect, as does the Scurfy Bark-louse.

The reason for considerably more damage being done by the San Jose Scale than by the Oyster-shell Bark-louse is on account of the San Jose Scale producing many broods in one season, and also bringing forth its young alive, whereas the Oyster-shell Bark-louse is one-brooded and winters over in the egg stage.

The treatment to be adopted for nearly all the scales is practically the same in all cases. On deciduous trees, where the scales remain during the winter upon trunks and branches, and where the trees become dormant, the scales are best treated during the winter. At that time there is no foliage to interfere, and much stronger washes can be used than would be possible during the summer, or when the tree is active. It is extremely difficult to penetrate insect tissues with ordinary liquids, and it has been found impossible in practice to obtain good results in the destruction of scale insects, except by means of caustics. The common soaps are all caustic, and, when applied in strong solutions, the scale is shrivelled, lifted, and partially corroded, so that the oily mixture works its way beneath into absolute contact with the insect. Or it is raised at the edges and washed off by the rains, carrying with it either eggs or young, as the case may be. In fact, where the eggs hibernate, winter applications act only by exposing them, so that they are easily washed away by rains and scattered.

In the case of plants which do not lose their foliage at any period, or in conservatories, or where winter treatment for any reason is not feasible, we must attack the insects when the larvae are crawling about, and before they are fixed. At that time, whilst not protected by a scale, they may be easily killed, almost any of the contact insecticides being effective.

*Remedies.*—Owing to the large number of applicants who were desirous of obtaining information on the best methods of combating the Oyster-shell Bark-louse, it was decided to carry on a number of experiments here, to test the efficiency of the various insecticides commonly used against scale insects.

Of all the spray mixtures tried, the well-known lime, salt and sulphur wash gave the best results.

The lime, sulphur and caustic soda, and the lime, sulphur and sal soda were also tried, but without quite such good results. The lime, sulphur and caustic soda proved to be a little superior to the lime, sulphur and sal soda, owing to its apparent power of better penetration.

*Soaps.*—Various soaps were also tried, and of these the Whale-oil Soap Emulsion gave the best results, many of the scales being killed.

The Whale-oil Soap gave good results also, but not equal to the Emulsion.

Sunlight and Lifebuoy soaps, and also a mixture of both, proved to be of very little value, inasmuch as they did not prevent the eggs from hatching. These soaps are claimed by the makers to be most effective against the San Jose and other scale insects, but applied as a winter wash against the Bark-louse they have little value. Undoubtedly they should be applied after the young lice hatch, and not as a winter application, and then would most likely prove effective against the tender lice.



*Kerosene Emulsion*.—Kerosene Emulsion was also tried, and this proved of more value than the Whale-oil Soap Emulsion, but not so effective as the lime, salt and sulphur wash.

*Lime*. Quick slaked lime,  $1\frac{1}{2}$  lbs. to 1 gallon of water, proved very effective applied as a winter wash, and equalled the results obtained by the lime, salt and sulphur.

*Kerosene-Lime*.—This was also tried, but did not prove superior to the Kerosene Emulsion, and therefore is not to be preferred to it.

The lime-sulphur sprays must not be applied while the trees are in foliage, first, because of the disastrous results that follow when this is done before the leaves have matured; and secondly, because of the difficulty in making a thorough treatment at such a time. The month of March and the early part of April, before the buds commence to open, is a good time to spray with these mixtures.

### THE BEAN WEEVIL (*Bruchus obtectus*, Say).

By ARTHUR GIBSON, ASSISTANT ENTOMOLOGIST, CENTRAL EXPERIMENTAL FARM, OTTAWA.

An insect which, fortunately, has only been reported on a few occasions as doing damage in Canada, is the Bean Weevil, *Bruchus obtectus*, Say. Authentic instances of injury by this insect have been received from one locality in Ontario, and from two in Quebec. The injury in all cases was to seed beans.

The Bean Weevil (Fig. 36) is a small, hard-shelled beetle, one-tenth of an inch long, oval in form, with the head bent down and more or less concealed, as seen from above, and prolonged into a squarely-cut snout, or beak. Its antennae are distinctly jointed and enlarged at the tip, the first four joints and the last one reddish. The wing-covers are marked with ten impressed and dotted longitudinal lines, and the whole body is covered with long, silky hairs. The lines on the wing covers are broken up into pale yellowish dashes and dark brown spots. The tip of the abdomen extends beyond the wing-covers, and is of the same reddish tinge as the tips of the antennae and the legs, but is covered more or less with short, silky hairs, and bears a central white line, but there is no appearance of the two black spots so conspicuous in the Pea Weevil, which it resembles in shape and movements. Compared more closely with this latter well-known insect, the Bean Weevil is not one-half so large, is more soberly colored, having less white on the wing-covers, and lacks the white spot on the middle of the



FIG. 36.—The Bean Weevil.

hinder part of the thorax, and the two black spots mentioned above, which are present on the exposed tip of the abdomen of the Pea Weevil.

"The life-history of the Bean Weevil differs in some important points from that of the Pea Weevil. The eggs of both are laid upon the pods while these are young and tender. On hatching, the young grub of the Bean Weevil eats its way inside and penetrates one of the forming beans, several grubs entering a single bean, each one forming for itself a distinct cell. They become full-grown, and change to pupae in the autumn, and a little later to the perfect beetles. The date of emergence from the seed depends very much, as in the case of the Pea Weevil, on the temperature in the autumn months; it may be in the late autumn or not until next spring; when the seed beans are stored in a warm building, the beetles may emerge at any time through the winter. One of the important differences between the life-histories of the Pea and Bean Weevils is that, whereas in the case of the former the young grubs can only enter the soft green seeds, those of the Bean Weevil can propagate for three or four generations in the dry stored seeds. This fact renders the well-known domestic remedy for the Pea Weevil, of holding the seed over for two years, quite ineffective in the case of the Bean Weevil; that is, if the bag of peas infested with the Pea Weevil were put away for two years, the Pea Weevils would emerge the first spring and die in the bags. But in the case of a bag of beans infested by the Bean Weevil kept in the same way, the beetles on emerging would at once set to work to lay eggs on the beans. The young grubs when hatched would penetrate the dry seeds and go through all their stages, and this breeding might be repeated as long as the supply of beans lasted. Curiously enough, the Pea Weevil does not bore holes through the paper or cotton bags in which infested seed has been stored, but in the case of the Bean Weevil, such bags are readily perforated and the beetles escape,—frequently when this happens in houses, as is sometimes the case, to the great consternation of the inhabitants." (Fletcher, Bull. 52, Cent. Exp. Farm, Ottawa.)

In the United States the Bean Weevil has been known for a great many years. It was found injuring beans in America in 1860, near Providence, Rhode Island. Since then it has become wide-spread in distribution in that country, and has done a considerable amount of damage. At first it was considered to be a native species, but it is now thought that the original home of the insect was in Asia, and that it was introduced into America through commerce. The first record of injury done by the Bean Weevil in Canada was in 1898, in Middlesex County, Ontario, and since then two further instances of loss from the ravages of this insect have been reported from Quebec Province. Quite recently the writer heard of the presence of the Bean Weevil at Guelph, Ont., in beans imported for seed from the United States. (It has also been reported from Aurora, Ont.—C.J.S.B.)

The Bean Weevil shown herewith is only about half the size of the Pea Weevil, but resembles it in general appearance. The best remedy for both of these insects is bisulphide of carbon. The most convenient way to fumigate is to place the seed in an ordinary coal-oil barrel, and pour on it one ounce of the bisulphide of carbon for every 100 lbs. of grain, then close the barrel tightly, first with a wet canvas or cloth, and on the top of this boards, which should be left undisturbed for at least two days.



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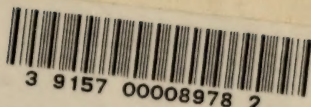
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